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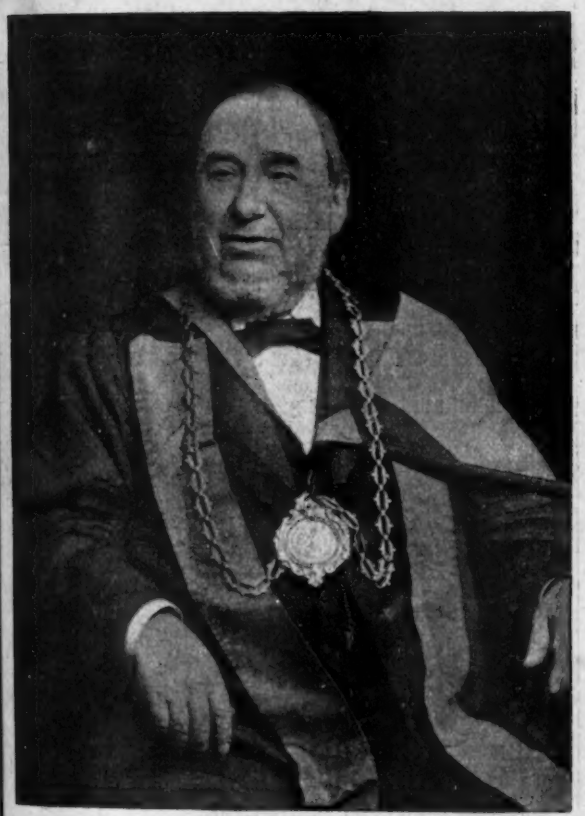

GEORGE RAE, Esq., F.E.I.S.,
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A MONTHLY MAGAZINE AND REVIEW

FOR THE SCHOOL-ROOM AND THE STUDY

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EDUCATION IN PARLIAMENT—JANUARY.

NEVER was the air more full of rumours about an Education Bill than during the fortnight which preceded the gorgeous opening of the second session of the first Parliament of King Edward's reign. No two of the rumours agreed with each other, of course; two rumours breathed out by London correspondents of daily papers never do. And every "London correspondent" in London inspired and then respired his own particular rumour about that fascinating topic the Education Bill. Let me collate a few of them here: I summarise.

"The rumour that the Government will be unable to deal on a large scale with the question is quite unfounded. The Duke has already the draft of his Bill in readiness, and is fully determined to fulfil the promise, made last session, to carry it through. A local authority—in all probability the County Council—will be created in every part of England and Wales, and be given power to supervise education of all kinds, and possibly to control all schools, whether elementary, secondary, or technical. Voluntary schools will be specifically dealt with, and whilst the cost of these establishments will be thrown on the public, a clause will be introduced giving the ratepayers representation on committees of management."—*Rumour No 1.*

"It seems probable that the Cabinet may not be able to agree on the terms of a comprehensive Education Bill, and that the whole subject may be postponed to another session. The Bill is not yet drafted."—*Rumour No. 2.*

"Mr. Balfour will pilot the Education Bill through Parliament. This is a snub to Sir John Gorst, who can hardly help but resign."—*Rumour No. 3.*

"Sir John Gorst is said to have put his foot down, and threatened to resign if certain proposals are embodied in the Bill; and, in the present condition of affairs, the Government cannot afford to have Sir John as an independent critic, so that he is likely to obtain much of his own way."—*Rumour No. 4.*

"Sir John Gorst is at present the guest of the Duke of Devonshire at Chatsworth, and it may be presumed that the two chiefs of the Education Department are occupied in drafting the outlines of the new Education Bill. The only thing that seems certain is that it will deal with the question of the Voluntary schools."—*Rumour No. 5.*

"The Bill will deal only with secondary and technical education. It will be the abandoned Bill of last session reprinted—that is all."—*Rumour No. 6.*

"The Bill will consist of two parts—one dealing with secondary and technical schools, the other with Voluntary schools. If needs be, it may be divided into two Bills."—*Rumour No. 7.*

"The difficulties in the way of the Bill fall under four heads: (1) differences in the Cabinet; (2) Conservative opposition founded on ignorance; (3) Liberal Unionist opposition founded on tradition; (4) sessional complications."—*Rumour No. 8.*

"The Cabinet are quite agreed and united on the main lines of the Bill. Details will be left very much to the House of Commons to settle."—*Rumour No. 9.*

"The Government do not see their way, in face of the claims of South Africa and the National Defences on Parliamentary time, to the passage of a really great Education Bill, and they will but be doing their duty to the country and justice to themselves in refraining from introducing any Bill at all."—*Rumour No. 10.*

"The educational legislation of the coming session is likely to be confined to placing the 'Cockerton' Act of last session on the Expiring Laws Continuance Bill, so as to hold the question over for another year."—*Rumour No. 11.*

Oh the quiddity of quidnuncs and the expertness of experts! Let us get to surer ground. It is certain that the Government would deal with the Voluntary school question, if they dared. But the difficulty about

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that is that the Voluntary school champions are quarrelling among themselves as to how the Voluntary school question is to be dealt with. In a letter to the Archbishop of York on 4th January, Lord Salisbury stated that "the question is one of extreme complexity; it is occupying the earnest attention of the Government." It is a question of extreme complexity indeed. Let us consider what leading churchmen have been saying about it this month.

The Archbishop of York feels the difficulties of the position, and says that many of the Voluntary schools are now in a worse position than ever, because of increased expenses; *but he does not quite ask for rate-aid.* Canon Scott Holland remarks that a compulsory rate alone "can bear the joyful strain." I don't know what the canon means by that particular phrase; a canon is supposed to be musical, and to "bear a joyful strain" is not exactly what the Voluntary schools have been singing of late. "Numbers of Church schools must close in two years at the outside," says the vicar of Vauxhall. Lord Hugh Cecil won't have the problem confined to Voluntary schools; Board schools must be dealt with also, and the Cowper-Temple clause be repealed: nothing will satisfy Lord Hugh but "religious teaching which helps to make the children firm and faithful adherents of a religious system." The editor of *The Pilot*, who used to edit *The Guardian*, writes that it seems absolutely certain that no measure to secure more public money for denominational schools will be introduced, and "if introduced, no such measure could possibly pass."

One school of Church of England thought suggests the admission of Nonconformist teaching into Church schools in return for the admission of Church teaching into Board schools. But Mr. Lacey, a Ritualist vicar, carried the English Church Union Assembly with him when he protested that "the whole *raison d'être* of a Church school is the exclusion of non-Anglican influences." Lord Hugh Cecil "would gladly support building grants to assist the erection of Nonconformist schools." Mr. Lathbury breaks away from these counsels of denominational perfection, and asks, "Does not Mr. Lacey forget that what has to be considered at this moment, with a new Education Bill on the horizon, and Voluntary schools dying for want of support in all directions, is not what is ideally best, but what is best under the circumstances?" And Canon Scott Holland, fired with the desire to be practical, makes the luminous observation that "the dispute can be almost narrowed down to one point—the appointment of teachers. Everything else could settle itself with ease. Cannot we get this last angry spot to dissolve?"

But here steps in the Executive of the N.U.T. The Convocational Committee has recommended denominational teaching in Board schools, and the Executive are quick to scent the danger to the freedom and independence of the teachers. They have entered "an emphatic protest against anything which would lead to the selection of permanent teachers in Board schools for the purpose of denominational religious instruction, as this would induce the imposition of theological tests upon teachers, and applicants to be teachers." Yet Mr. Griffith-Boscawen, M.P., insists that, in dealing with the religious question, we must establish, at all events, one great principle—the parents' right to have their children taught their own religion." So the Convocational Committee said; but the "National Society" said different.

In short, the Church party has not been brought into line, and the Cabinet may well be loath to legislate for a house divided against itself. "Education spells humiliation," Mr. Balfour remembers. "Half the money we pay already is wasted," says the Chancellor of the Exchequer. "I was in favour of Board schools in 1871," the Duke of Devonshire recalls; and he whistles, not for a wind this time, but with dismay. Delay and procrastination have made the question of educational reconstruction more difficult than ever. *Teste sibylla.* A "comprehensive Bill" last year would have been one dealing with secondary, technical, and Board schools; but the meaning of the word "comprehensive" has been extended since then to cover the Voluntary schools as well. Timorous and dilatory government is its own revenge, and well the Duke may whistle. For, amidst the jangle of dissonant cries from the Voluntary school world, the Free Church Federation, the Trades Union Congress, and the Co-operative Union call strongly for universal School Boards. Five years ago, the Government might have set up a local authority for secondary and technical education only; but since then the appeal of the National Union of Teachers for "one authority only" has been powerfully endorsed by all sorts and conditions of men, and the trend of events is in its favour. The Government cannot wash their hands of the whole question now, because the higher-grade schools and evening continuation schools under School Boards *must* be dealt with again before August. The long and short of it is, reflects the Duke, that there is the very deuce to pay about this blessed Education Bill.

And thus we are come, in doubt and apprehension, up to the eve of the opening of Parliament; and, for the first time in the history of England perhaps, the whole thinking part of the nation hangs on the lips of the Lord Chancellor as he mouths the King's Speech, to hear if there is to be an Education Bill, and what is to be its scope, as judged from the phrase in the Speech about it. Let us hie ourselves to the lobby and buttonhole some returning M.P.: "What does the Speech say?"

"*My Lords and Gentlemen, proposals for the co-ordination and improvement of primary and secondary education will be laid before you.*" These words came sonorously from the lips of the King, and no part of the Royal Speech seemed to be listened to more acutely, the buttonholed member said. The Speech redeems Mr. Balfour's promise of last session: education *does* hold "a very early and honourable place." It stands first on the list of Bills to be submitted to Parliament; it is early, and it is honourable, because a Bill to co-ordinate and improve primary and secondary education cannot fail to be a big and important Bill.

The phraseology of the Speech in its reference to the subject could hardly be improved. The words connote a comprehensive measure. The agitation carried on by the teachers and their leaders during the Recess have not been without fruit—or blossom, at any rate. For the references in the King's Speech can only be taken as the blossom that *may* develop into the fruit later on. But to have brought about the promise of a comprehensive and *co-ordinating* Bill *is* a great point gained.

FERULA.

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BY MANY HANDS.

"Quot homines, tot sententiæ."

OUR readers will be glad to note that THE PRACTICAL TEACHER will attain its majority in March next, and they do not need any external evidence to assure them that its twenty-one years of life have been years of growth. Its present popularity is a matter of congratulation to all concerned in its production, especially to Mr. H. Scheurmier, who has been closely connected with the magazine from its first issue. When Messrs. T. Nelson and Sons became the proprietors of the journal, Mr. Scheurmier undertook the duties of Editor and Manager, and under the new proprietorship and management its monthly circulation has been more than doubled. The firm has now shown its appreciation of his business qualities and educational experience by appointing him manager of their London house. His new duties compel him to relinquish the personal supervision of the literary side of the magazine, but he will still retain the general management of THE PRACTICAL TEACHER, and of its popular companion magazine THE PRACTICAL TEACHER'S ART MONTHLY (edited by Mr. J. Vaughan, Superintendent of Drawing and Manual Training of the Glasgow School Board). The direction of the literary work of THE PRACTICAL TEACHER will in the future be in the hands of Mr. George Collar, B.A., B.Sc., who has been for some years a regular contributor to its pages, and whose experience both as a writer on educational topics and as a practical teacher eminently qualify him for the work. The staff of eminent educational authorities and practical teachers who have done such good service in the past will continue their assistance, and our hope is that the sphere of usefulness of THE PRACTICAL TEACHER will continue to widen as its years increase.

Coming of age of "The Practical Teacher."

* * *

IN our article, "Well-known Teachers at Work," of October 1900, we referred to the Christmas letter which the children of Somerville Road Board School, Birmingham, receive from their headmaster, Mr. C. F. Hayward. Knowing that many teachers are deeply interested in this novel institution, and that many requests have been made for copies, we insert the eighth of the series :—

Mr. Hayward's Christmas Letter.

"LINCOLN VILLA, TENNYSON ROAD,
SMALL HEATH.

"MY DEAR SCHOLAR,—It seems to me but a few days ago since I wrote my last Christmas letter, and yet a whole year has gone by.

"I wish you once again a very Happy Christmas. If I could have my own way this morning, and could do just as I would like to do, I would send you heaps of friends who could laugh and have fun with you, who could play with you and make you glad. I would send you toys, and sweets—not too many—and all things that bring mirth to the hearts of boys and girls.

"Perhaps it is a good thing I cannot have my own way. And, after all, I do not think that toys and sweets are what you want most. I know that in a good many homes there has been of late many a boy and many a girl, yes, and many a father and mother too, sick. What have you done to help, to soothe? I hope you have done much, and that on this day you can with all your heart say, 'I have done all that was asked of me.' If you can, you have done well. But if you can also say, 'I have done all I knew was wanted of me, without being asked,' you have done better. Boys and girls, what you want most is a heart that beats for others. Your own joy will come when you see how glad others have been made by your own kindness, by your own gentleness. This joy I cannot give you. But I can wish it for you, and I can tell you that by your thought for others you will grow day by day more lovely and more loved. Be on the look-out for times when you can help—by a word, by an act.

"I wish you, too, a Bright and Happy New Year.

"Think what this means. You have my best wish and my most sincere hope that no loss, no pain, no sorrow may come to you; but that joy, and happiness, and peace may dwell with you and help you in all you put your hands to do.—I am your affectionate Master and Friend, CHAS. F. HAYWARD.

"*Christmas Day, 1901.*"

This letter was handed to each child on "breaking-up" morning in a sealed envelope, on which was printed the instruction, "Not to be opened till Christmas morning." Each of the previous letters has borne a similar command, and we are informed that on only one occasion has this injunction been disobeyed, and that more through thoughtlessness than wilful disobedience.

The children look expectantly each year for the Christmas wishes and messages from their master and friend, and these are carefully read and preserved. Many old pupils have already called or written for this year's letter, as they are anxious to possess the complete series. This speaks volumes for the success of the undertaking, and shows how fully Mr. Hayward's kind messages are reciprocated. The circulation of these letters is not confined to the school district; they have found their way all over the world. Answers have been received from Australia, India, and even from ex-scholars now serving in South Africa, while such well-known men as Sir John Lubbock and Bishop Weldon have spoken in the highest terms of their power for good; the Bishop of Oxford thinks so highly of them that he once asked for copies to hand to his own children.

This keeping in touch with ex-pupils seems to us to have great possibilities, for we believe that the influence of such a man as Mr. Hayward must be an important factor in causing these young people to continue their education, with which so many pleasant memories are associated.

We find that other teachers are following this example, and have before us a letter modelled on exactly the same lines. We are pleased to see this, and recommend others to do likewise. There may be a difficulty in carrying this on year after year, for we can quite imagine that, in the case of a large school, the number of ex-pupils who wish to hear from their old master will grow to such proportions that the distribution will become increasingly difficult.

* * *

THE new year is opening vigorously in the pedagogic world, if we are to judge of it by foreign editorial activity. We have for some time been favoured with the organ of the Roumanian teachers, an elaborately produced and serious journal, whose only drawback is the language in which it is printed. Now Hungary has determined to follow suit. A journal has been founded to make known to the rest of Europe how the Magyars have progressed educationally. This is its avowed object. "Not knowing Hungarian, the impartial observer is unable to obtain information for himself; and as for the numerous enemies of the Magyars, they seem to have set themselves the task of representing us in the worst possible light to foreigners." Thus says the editor, and we wish him success in his efforts to place his native institutions in their most favourable light.

Recent Arrivals.

Luckily, his journal, which is excellently printed and edited, is published in French and German, so that the rest of Europe may have a real chance of reading it. We say luckily, for we once tried to learn Magyar, with almost fatal results.

FROM Belgium also comes a new publication, *L'École Nationale*, "The National School"—that is, the State School—printed in French. This is a business-like journal, representing the wants and aims of the Belgian primary teachers. It opens its columns to discussion, gives practical courses of instruction, contains excellent articles, and, indeed, looks like a slim copy of THE PRACTICAL TEACHER. It seems a very healthy infant, and we hope it will survive to a robust old age.

Healthy Infants.

Not only are Hungary and Belgium in the throes of editorial parturition, but the Latin Countries also. The new decrees in Spain are causing quite an outbreak of educational literature, a sign that there is yet a spark of life in that strange and beautiful country; while from far-away Argentina we have been favoured with a most imposing volume, which represents both the professional and the official elements in the educational work going on about the banks of the River Plate.

The year 1902 will doubtless see the birth of many infants of the printing-press. To none do we more heartily wish long life than to these healthy youngsters of Hungary, Belgium, Spain, and Argentina.

THE teacher of human physiology must be on his guard. Another discovery is announced from America, made by Professor Loeb of Chicago, on the method of nerve action. "The professor's announcement," says the reporter, "is in fourteen statements couched in scientific terms, both new and otherwise indefinite." These being unintelligible to the laity, our reporter tries to reduce them to simpler language. We are not quite certain that he has succeeded. When he says that the nerves contain colloidal solution, which resembles jelly before it "jells," we have a glimmering of his meaning. But when he explains the beating of the heart as caused by the tendency to gelatification of its colloidal constituents, we begin to doubt whether we care about our heart to be spoken of in that way. And to explain the phenomena of drunkenness as a lessened nerve irritability, caused by an increase in the permanency of colloidal solution and a prevention of gelatification, seems to us a light and frivolous way of treating a very serious subject. On the whole, we are inclined to think that the teacher of physiology will do well to wait for the professor's fourteen statements *in ipsissimis verbis* before attempting to incorporate the colloidal discovery into his lessons on nerve action.

Nerves or Colloids?

LIKE the Irish M.P. who said that he had to come to England to learn there was an "Irish question," we often have to look abroad to discover what is being done at home. At least, that was our thought on reading the following in a French contemporary:—

Who is It?

"The president of an English association similar to one of our educational societies writes to the members as follows,—

"You are invited to enter for one of the following competitions."

(Here follow fourteen subjects, from which we extract a few choice specimens.)

"1. The best musical execution of the *Powder Monkey* (this is a popular English air).

"2. The most majestic way of crossing the assembly room.

"3. Serenade on a tin-whistle. Theme: 'I will be your sweetheart.'

"4. The most mournful style of interpreting the poem, 'What are the wild waves saying?'

"5. Memory drawing. Subject to be given at the moment of competition.

"6. Reading aloud a previously unseen and unpunctuated extract.

"7. Three original stanzas for a *cracker*."

And others of the same quality. Now, which is the educational society that has proposed the competition? We should much like to know.

WITH OUR CHILDREN.

CHILD students will take up with interest a book recently published, entitled *The Mind of a Child*, by Ennis Richmond, author of *Boyhood* and *Through Boyhood to Manhood* (Messrs. Longmans, Green, and Co.). It is written with a deep sympathy with childhood, and contains much that is worthy of close attention, by parents especially, and most of all by those who, through social duties (or social neglect of duty), intrust their children's early training to the care or carelessness of servants. We have selected the book for notice in this column, however, on account of its bearing on that systematic study of children which is rightly, though not rapidly, coming to be regarded as part of the work of every practical teacher.

The Mind of a Child.

FROM this point of view the book is more remarkable than satisfactory. From the beginning of her study, the writer deprecates scientific study of children—whether from reading some ulterior and unworthy meaning into the word "scientific" or not, one cannot judge. If knowledge is desirable, surely the more exact it is the better; and science need not mean anything worse than exact or clear knowledge. "Child-analysis is a fascinating study," we read, "and a great many of us are apt to cover our real reasons for following it by a pretence to ourselves and others that it is from love of children that we take an interest in the why and the wherefore of their thoughts and actions." Now let all child students examine themselves and confess. They are discovered. Love of children, forsooth! Nothing of the kind. They study them merely because the study is "fascinating," and they are "fascinated" thereby.

"Pretence" in Child-Study.

BUT why are they fascinated by this study? The question may be best answered by considering who they are that attach most importance to child-study. They are those who have undertaken the supervision and education of children; who do not parade their love and reverence for them, but merely spend their lives in working, and thinking, and planning for their good; who are convinced that the more they know of children, the more they will be able to guide them wisely, and to help them where help is most needed; who realise that exact and thorough knowledge, even though open to the charge of being

Its Real Motive.

"scientific," is more useful than vague conceptions and ideas; who, therefore, study children systematically, for the good of the children themselves, and by the aid of their science enlighten and inspire their art—the daily work of ministering to the physical, mental, and moral necessities of their pupils. "Fascination" is a false alarm. Those who have not the best interests of childhood at heart will soon escape from its charms.

WE naturally turn with most interest to those parts of the book which deal directly with "the mind of a child," in order to find what the writer has to tell us about it. She groups together, reasonably enough, the moral and the spiritual, and says in the introductory chapter, "To me, this mind centres in, is a part of, this spiritual existence;" while in the following chapter we read, "The mind of a child *is* nothing." Later, "The mind of a child deserves just as much respect as does the mind of a grown-up person" (more respect, perhaps, but that by the way); and on the same page recurs the dictum, "A child's mind *is* nothing."

"Ex nihilo—"

DESPITE the writer's deprecating scientific analysis and generalisation, her book contains many sound rules of conduct towards children, which can only be based on such generalisation. How has she reached those excellent results? By instinct, or by observation? And are we to accept the writer's statements on her personal authority alone, or are we to make our own observations and accept her rules so far as we find them justified by the facts? The writer has evidently spent much time in doing, perhaps unconsciously, exactly what she declares ought not to be done. If her study had been more consciously scientific, and if her language were more in conformity with logical and normal usage in expressing ideas, child students would certainly have been much indebted to her. As it stands, however, their debt is not overwhelming.

Our Debt.

WE have heard much in condemnation of the *questionnaires* which child students have set, not always wisely, to be answered by children. It may be pointed out that the ordinary written exercises of a class may be largely used for such study, without setting any "problem" to be formally answered. Composition exercises are not always mere reproduction of facts given by the teacher. Whenever a subject is prescribed which demands some personal and original thought, it is possible to deal with the paper in two ways—(1) as a test of the pupil's command of language, including grammar, spelling, etc.; and (2) as an indication of the pupil's mental attitude, tastes, and interests. By recording the results in the second aspect, the teacher may acquire useful information on many of the points which have hitherto been dealt with by the formal *questionnaire*, and under circumstances which avoid some of the pitfalls of that method. By previous arrangement among teachers, an identical subject may be given simultaneously to a large enough number of children to make the results of considerable value.

Informal Questionnaires.

TO give an example, the pupils in a large school (or those of them who have reached the stage of doing written composition) may have the subject of composition for the day announced as an essay on "the most beautiful thing you have ever seen." As a mere composition exercise, the subject gives good scope for descriptive writing. As an experiment in the study of children's ideas of beauty, the analysis of a few hundreds of such papers would be of the greatest value to all who realise the value of æsthetic education. There are scores of other subjects of this nature which may be treated in the course of ordinary school work. Their value in child-study will, of course, depend entirely on there having been absolutely no "getting up" of the subject beforehand, and to this extent such a type of composition exercise will not be approved by teachers who aim at putting into a pupil's mind everything which is subsequently to be given out in language. A boy may have less to say on such a theme, but what he does say will have vastly greater significance for the thoughtful teacher.

For example.

The question regarding beauty suggested above has been already actually used as indicated, and the results may shortly be discussed here if space and occasion permit.

N.U.T. NOTES.

FOR many years past the National Co-operative Union has sent representatives—who have been enthusiastically welcomed as fellow-workers in the cause of education—to our Easter Conference. They have generally been received at the termination of a lengthy session, and hardly had the opportunity of exhibiting their undoubted quality. This year, at Bristol, they will have the place of honour. An additional step towards cementing the friendship between the organisations was the holding of a kind of round-table conference at Russell Square between a few representatives from each Union, when the next Education Bill was fully discussed. Mr. Councillor Brown (ex-Mayor of Newport) and Messrs. W. R. Rae (Sunderland) and Johnstone (Manchester) thoroughly endorsed the Union's proposals, and much is expected from their active assistance and co-operation. The members of the Co-operative Union are all for progress and fair play, and individual members of the N.U.T. might do worse than ally themselves with the co-operatives whenever and wherever opportunity offers.

A Useful Conference.

THOSE pseudo-superior people addicted to sneering at what they describe as the "Teachers' Trades Union" cannot do better than apply to Bolton House for a copy of the syllabus for the N.U.T. Diploma examination, accepted in its final form by the Executive at its January meeting. At the present moment the gravest fears are entertained in well-informed quarters that there is an intention or disposition to lower the educational value of the primary teachers' certificate—that certificate which the Rev. T. W. Sharpe, C.B., assured us, years ago, "*demands a higher standard than the B.A. degree of some of the universities.*" Possibly the action of the Board of Education in abolishing the examination hitherto held at the close of the first year's college training is generally approved; but, in the olden days, the syllabus for the certificate examination demanded "an irreducible minimum," which every student was compelled to work for. The liberty now given to the colleges to select their own curriculum may, in the case of the ill-equipped colleges, be productive of genuine and permanent harm to the community. Therefore the

The N.U.T. Diploma.

N.U.T. Examinations Board is to be heartily commended in its desire to establish a new diploma, the holders of which must assuredly be possessed of an unusually thorough knowledge of both theory and practice of education. The chairman and secretary of the Examinations Board, who received simply invaluable assistance from Professor Welton, Principal Salmon, and other "experts," have built up the details of the syllabus with loving care. All concerned richly deserve the congratulations of their colleagues on the result of their efforts to maintain the highest educational attainments amongst the teachers in the nation's schools.

LITTLE did I think when I wrote last month, in these pages, "Some day or other Conference may determine that the Executive shall elect the Vice-President. After all, the Executive is the only body to whom an accurate estimate of the various candidates' qualities is possible," that the January Executive meeting would witness a full-dress debate on this very topic. Mr. T. F. Bowers, B.A., one of the South London representatives, invited the Executive to place on the agenda of the Bristol Conference the following motion: "That, in and after 1903, the Vice-President of the Union be chosen by the Executive at its first meeting after the Easter Conference." Very ably did Mr. Bowers argue the question. He proved that it is the almost invariable practice of bodies analogous in constitution to the Executive to choose their own chairmen; showed how serious and heavy is the financial strain, under the existing system, on the candidates and their friends; alluded to the vastness of the constituency, and the absolute impossibility of the candidates being known to more than a small fraction of the electorate; and enlarged on the abundant opportunities afforded at Russell Square for the selection of the fittest man or woman for the post. The objections urged against the proposed reform were mainly: (1) that it emanated from the Executive itself; (2) that the privilege of voting for the Vice-President was one dearly prized by the rank and file; (3) that it might possibly result in acrimony, distrust, and the formation of "rings." Mr. Bowers and those who agree with him were easily outvoted; but the fact that *eleven* members intimated their assent to his suggestion was to me both surprising and significant.

An Interesting Debate.

BUXTON is the latest aspirant for the honour of entertaining Conference in 1903, and truly it will be a formidable rival to the enterprising watering-places on the Lancashire coast. (Hull has during the past month reluctantly withdrawn its invitation, because the only hall suitable for conference purposes is already "booked" for Easter 1903.) On behalf of Buxton it is claimed that (1) the town is central, and has admirable railway facilities; (2) there will be ample accommodation for the members of Conference; (3) no Conference town of recent years has had such capital hotels; (4) the Pavilion and Theatre, or Pavilion (Central Hall or Corridor), can be secured, at a very reasonable rate; (5) for excursions, ball, concerts, etc., Buxton is undoubtedly one of the finest centres in the country; (6) the local teachers are thoroughly united and enthusiastic on the question; (7) there are several other large buildings which can be secured for sectional meetings.

Invitation from Buxton.

Meanwhile a most ornate invitation card has been issued by the Mayor and Town Council of Blackpool, urging that Blackpool is "an ideal Conference town from every standpoint;" and undoubtedly its claims are great. Whether the choice will fall on Blackpool or Buxton, Southport or Morecambe, I am, of course, unable to say; but that facilities for "business combined with pleasure" will be furnished to an unusual extent next year, cannot be denied. A. C.

NOTES FROM THE NORTH.

DR. J. EDWARD PARROTT, Edinburgh, delivered to the Glasgow Branch of the Educational Institute an interesting address on the subject of "The Legitimate Aspirations of the Teacher." He congratulated Scotland on recognising that the be-all and end-all of the educational system was the welfare of the child —the only true basis of a national education. He contrasted this idea with that of England, in which the child was the football of sects and political parties, and, as a result, national education was a thing of shreds and patches. The Scottish educationist, following John Knox, thought it was the duty of the state to see that every child had the full benefit of the whole educational resources of the country, if it was found he was likely to profit by them. It was a most important aspiration on the part of the teacher to foster and cherish this national faith in education. He besought them to see that the foundations of general education were well and truly laid. Only upon such foundations could the technical and commercial school arise as a fair and goodly institution. All their wood-chipping, cardboard cutting, paper gumming, and drawing at arm's length would be vain unless the child was furnished with the instruments by which he could proceed to Carlyle's greatest of all universities—a collection of books.

The Teacher's Aspirations.

IN dealing with present-day educational politics, Dr. Parrott deprecated the action of the Scotch Education Department in seeking to differentiate the public school teachers of the future into a superior and an inferior class, comprising those who were university trained and those who were training college trained. This matter is a question of vital moment to the future status of the teachers of Scotland. It is understood that the Institute has made representations on the subject to Lord Balfour of Burleigh.

Alluding to the Educational Bill of the forthcoming session, he was of opinion that education would be municipalised in England, that the *ad hoc* principle would be swept away, and that a rate-aid in some form or other would be given to the voluntary schools. The School Board should certainly be enlarged, but the *ad hoc* authority should be preserved, and education, as he puts it, should not be relegated to a body which would diffuse itself on anthrax, police, lunacy, and other matters.

Dr. Parrott on Present-Day Educational Politics.

IN referring to the personal aspirations of the teacher, he expressed the hope that they would still obtain an adequate retiring allowance, and he advocated the establishment of a consultative committee similar to that set up by the English Board of Education, which had a teachers' representative on it. In

The Personal Aspirations of the Teacher.

dealing with the Institute, he urged that it should be made a strong and vigilant body, capable of acting vigorously and effectively in the face of impending national legislation, and that the teachers of Scotland should secure the return of a teacher member to the House of Commons. In connection with this last point the Institute has sent down a circular to the various branches requesting some expression of opinion to guide it in the adoption of a definite policy.

We trust the branches will come to a clear decision on the matter; and while the difficulties may be great, yet they do not seem to us insuperable. The advantages would be immense.

PERHAPS the subject that is receiving most attention at the present time in Scotland is that of the training of teachers. On this question the Institute recently had a private interview with Sir Henry Craik and Lord Balfour, but up to the present the results have not been made public. The matter is being raised in an acute form over Circular 329. It is with pleasure we call attention to the lecture on the subject given by Mr. James Knight, Glasgow, before the Royal Philosophical Society of that city, and just published. It treats of the subject in a most exhaustive manner.

Training of Teachers.

LORD BALFOUR, in opening two new schools in Edinburgh, took occasion to refer to the subject of the Merit Certificate. Some people imagined, he said, that this certificate was a mere toy of the Scotch Education Department—a thing of no great importance. His view was different. He looked upon it as a serious effort to put elementary education on a sounder and better basis than before. It was, and ought to be, regarded as the proper goal of elementary education. The co-operation of parents and employers of labour would help the Department to do what by itself it could not do, what it believed was the right thing to be done, and what he believed would be for the great advantage of succeeding generations if it could be satisfactorily accomplished.

Lord Balfour of Burleigh on the Merit Certificate.

LORD BALFOUR, in the course of his address, said that he did not think any new changes would be introduced for some time with regard to primary education, but admitted that the Education Department were now considering whether they could not do something to make a more definite goal for secondary education —something akin to the Merit Certificate in elementary education. Instead of giving a Leaving Certificate for individual subjects, they hoped to group the subjects. He did not wish it to supersede the individual certificate, but he thought it would be desirable that, with a certain freedom of choice to suit certain individual cases, there should be given in future a grouped certificate, instead of only isolated Leaving Certificates.

Lord Balfour on Secondary Education.

With regard to freeing secondary education, he deprecated such a course. At present they were drawing something like £60,000 a year for fees from secondary education, a sum which very soon might go up to £80,000 a year; and he sincerely hoped that that large sum would not be rashly or inadvisedly thrown away, because he was certain if it was there would be a great recoil, owing to the cost they would put on the community, and they would get a much worse article, and they would not benefit the people on whom they were conferring the boon.

AN important modification has been introduced by this circular. Henceforth Leaving Certificates, properly so called, will cease to be issued in respect of passes in single subjects, and will be granted only in respect of passes in certain well-defined groups. The detailed arrangements are still under consideration. The circular explains that while candidates will no longer be furnished with a "Leaving Certificate" for each subject in which they may be successful, they will receive instead a document certifying that they have passed in a specified subject and grade in the Leaving Certificate Examination. The Department are in communication regarding this change with the various professional and other bodies that accord recognition to the Leaving Certificates of the Scotch Education Department.

Circular 338 on Leaving Certificates.

R. G.

FOREIGN NOTES.

THE sixtieth anniversary of the Society for the Study of the Frisian Language and Literature was lately held at Joure, in Holland. During the forthcoming year the Society will publish a Frisian grammar, and it has determined to offer a prize of 150 gulden for the best reading book in Frisian. As a proof of the vitality of the Frisian tongue, we may mention that only a few weeks ago the eightieth birthday of the Frisian writer, Waling Dijkstra, was celebrated, when no less than thirty-five of his admirers sent him congratulatory messages, some of them poetical, in his mother tongue.

The Frisian Language.

AN incident narrated in *Het Schoolblad* is calculated to increase our respect for Frisian. In a certain school in Amsterdam is a teacher from Friesland. In the class of the teacher referred to is a youngster named Wibe, also from Friesland, and a particularly naughty youngster to boot. Having tried every way to bring the said youngster to a sense of his wickedness, and having failed, it occurred to the teacher to address him in their common tongue. The result was marvellous. The boy's heart was touched, his obstinacy vanished, and he is now a reformed character. The wonderful efficacy of Frisian in reforming bad boys is evident from the fact that "Wibe, det falt my fen dy óf" worked the miracle we have referred to, when repeated reproofs in classical Dutch had failed to produce effect.

A Hint for Teachers.

TEACHERS who read German are aware that considerable confusion reigns, owing to the various reforms in spelling, instituted at various times, but not universally adopted. In official correspondence, and in many newspapers and periodicals, the old spelling is still retained; while in other cases, innovations, as the use of small initial letters for substantives, are boldly introduced. With the object of rectifying these differences, a conference has recently been held in Berlin, attended by delegates from various government offices of the German Empire, from fourteen German states, from the Hanse towns and Alsace-Lorraine, and by representatives of the Austrian Government and the book-publishing trade.

German Orthography.

THE EDUCATIONAL INSTITUTE OF SCOTLAND CONGRESS.

FIRST DAY'S PROCEEDINGS.

DUMFRIES, the "Queen of the South," was this year selected as the scene of Congress, in large measure because the president for the year—Mr. George Rae, Wamphray—is a member of that branch. The beautifully-situated Border town has many attractions, not least of all for Congress purposes being the fact that it is remote from the "humming throng" of some of our great cities.

GEORGE RAE, F.E.I.S.,
President, E.I.S.

There was a good attendance of members at the Academy when the president, accompanied by the provost and local magnates of Dumfries and the officials of the Institute, took the chair. The usual formalities of welcome over, the president opened the proceedings proper by a short but interesting address. In the course of it he made reference to a few of the educational matters which had engaged the attention of the country during the past year.

Captain Pirie's Little Act.

The only educational Act added to the statute-book was the Education (Scotland) Act, 1901. Though not bulking largely in the eyes of the public, it was nevertheless an important enactment, as by it no child will be allowed to leave school until he is fourteen years of age. No Labour Certificates will now be issued, and the Merit Certificate no longer carries with it exemption. Necessitous circumstances, however, may be adduced; but the exemptions are so trivial, and are so hemmed in with restrictions, that it will be difficult for School Boards to put them in force with the watchful eye of the Department upon them.

Free-arm Drawing.

The president then discussed most adversely the introduction of free-arm drawing into the school curriculum. He slyly suggested the presence of a humorist in the Education Department, since the initial letters of the subject formed the word F.A.D., which he thought it would turn out to be.

The subject of security of tenure was then briefly dealt with, and the three ways open to satisfy the demands of teachers were touched on: (1) enlarged School Board areas; (2) an appeal to the Education Department or some legally-constituted body; or (3) that the teachers should be taken over as civil servants. With reference to the last, he did not think either the country or the teachers were ripe for such a proposal. The profession was in favour of the first, and though he was not quite in touch with his professional brethren on this point, yet he was willing to sink his own opinion for what might be considered by the majority for their benefit.

University Reform.

Mr. R. B. Haldane, K.C., M.P., Haddington, was next called upon to address Congress on the subject of University Extension and Reform. In introducing the question, he remarked that the subject of education appeared to him the most important, without exception, of the social reforms which awaited treatment at the beginning of the twentieth century. If they educated their people, they would reduce to comparatively insignificant dimensions the problem of housing, the problem of raising the condition of their masses. These things solved themselves, if they only got the right spirit into the people. In considering the extent to which the brains and the intelligence of the captains of industry in science and applied knowledge depended on the foundations essential to good education, he admitted he became depressed, because he found in this country a great backwardness compared with the state of things abroad, and in the countries of some of their leading competitors in the markets of the world. He thought there was wanting a more enlightened intelligence on the part of the public with regard to education.

Elementary Teachers.

JOSEPH J. GLOVER, ESQ.,
Provost of Dumfries.

Mr. Haldane then proceeded to make some criticism on the attitude of elementary teachers to and their conception of education. There was too great a disposition to treat elementary teaching as if it were a thing by itself, as if it could be separated from the whole of knowledge and the rest of culture. The work of the elementary teacher ought to be part of the work of a section of a great army, but of an army which must co-operate and work together.

To make their people interested in education they must make education interesting, and the elementary teachers would have to do their part to bring that about. The elementary teachers were what the law and constitution had made them; they had been too much cut off and isolated in a particular sphere. But the work must be done co-operatively; and the elementary teachers must assist, if they would emancipate themselves.

Secondary Education.

He suggested the welding of the educational system of the country into one complete whole, in which elementary, secondary, and university education should all be one indissoluble part of the system. This led him to the topic of his address—namely, University Extension and Reform. There was need, he thought, of introducing the operation of the university into the system of education, so that the universities might be the leaders in permeating our national educational system. The beginnings of a system of secondary education in Scotland they had now got under the Science and Art Department, and he hoped to see the Bill of Lord Balfour reintroduced and passed this session. The principle of the establishment of local authorities to deal with secondary education was a good one, and he wished an addition made to this—namely, five central councils, one in each university centre, where they could bring the influence of the universities to bear on the secondary education they were giving.

As in his recent Liverpool speech, he showed how this was done in Germany and the United States, and overdone in France. To this end, they must make more of the teachers, so far as their status was concerned, if they wished them to come up to the status which was desirable. In Germany there was a minimum wage for teachers. There was a great deal in that. Because the lawyer and the doctor in this country worked only for a minimum fee, there was no reason why we should leave the teacher to be a commodity bought in the lowest market, even if he were not always sold in the dearest.

Larger Areas.

In concluding his most able address, Mr. Haldane referred to the need there was for altering the School Board system. It did not do to take the little area, or the little board of little minds, and leave them to deal with a great national concern. The nation recognised that, and the State paid the bulk of the money; why, then, should the men of little stature (in Plato's sense) be left to handle it? He thought they would solve the whole question of the security of the tenure of teachers, and that in the end they would solve the question of the rate of salary, if they got large enough and intelligent enough educational authorities. It might be that at first they would require to have different authorities for elementary and secondary education. But his audience did not seem to agree with him in this point. He thought there might be a reason for keeping control of elementary education in the large cities apart, for a time at least, from the work that was done by the new authorities, who had to learn their work in the business of secondary education.

On the motion of Dr. Mackay, treasurer of the Institute, Mr. Haldane was heartily thanked for his address, and in reply Mr. Haldane took occasion to guard himself with regard to the dual authorities for elementary and secondary education. In the large cities he thought two authorities would be required, but in the smaller towns, and in some of the larger towns, it was eminently desirable that the system of education should be under one authority.

Unification of School Management.

The views of the Institute, as propounded by Mr. S. M. Murray, vice-president, in the next paper, "Unification of School Management," and as embodied in the motion which followed, are: "That all schools—technical, secondary, and primary—should be under the same management." In the course of his address, Mr. Murray showed that the county should be the unit of area, as this would simplify the governing machinery, lessen expense of management, equalise the rate, prevent overlapping, and, most important of all, fill in any hiatus in the complete scheme of education for the county by utilising the money available on a comprehensive basis. He advocated the *ad hoc* method of election as more in keeping with Scottish traditions. This authority should have control of *all* grades of education.

"Foreign" Delegates.

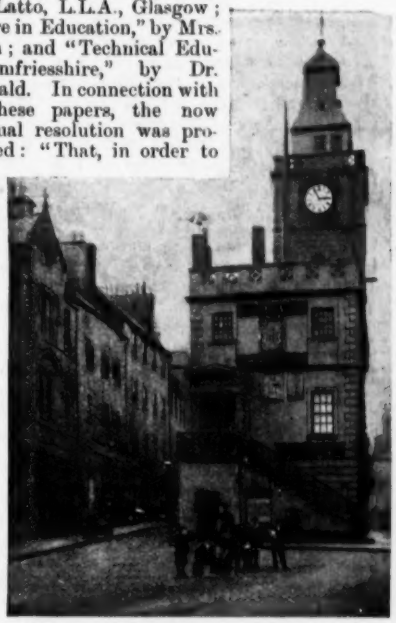
The Congress was then favoured by delegates from England and Ireland. Mr. Blacker (president, N.U.T.), in the course

DUMFRIES ACADEMY.

of his address, advocated closer union between Scottish and English teachers. There might be a federation between the two associations, as by this means they would form a body which would be able to do more good than if they were fighting singly. He hoped the day would soon come when the Institute had a representative in the House of Commons. This would be the best investment they could get for their money. Mr. Rankilor, Birmingham, in supplementing, expressed the hope that, close as the union between the two bodies had been in the past, they would in the future make the bonds firmer. The ideas and ideals of the two nations were the same. Mr. Timothy Manning conveyed the best wishes of the I.N.T.O., and in doing so spoke of the "grievances" under which Ireland laboured.

SECOND DAY'S PROCEEDINGS.

The second day's proceedings were largely devoted to matters of professional interest. Among the subjects discussed were "The Departmental System," by Miss J. D. Latto, L.L.A., Glasgow; "Woman's Sphere in Education," by Mrs. Kerr, Edinburgh; and "Technical Education in Dumfriesshire," by Dr. Gillespie, Mouswald. In connection with the first of these papers, the now well-known annual resolution was proposed and carried: "That, in order to secure the best educational advantages from changes recently introduced, it is essential that heads of departments be appointed in all large schools."



THE MID STEEPLE, HIGH STREET, DUMFRIES.

Training of Teachers.

To the "Training of Teachers," Mr. Williams (rector, Established Church Training College, Glasgow) devoted a very good paper. His views were not quite in accord with those advocated by the Institute in its recent interview with Lord Balfour, especially with reference to the proposal to divide the teaching profession into the two classes, university and non-university. In the "Notes from the North" this subject has been more than once referred to. Mr. Williams agreed with this division, and approved of the arrangements set forth in Circular 329. He thought the university-trained teachers would get employment in the advanced departments of the schools, and that the non-university trained would be found quite suitable for the junior classes and infants. Mr. Arneil, Glasgow, demurred to the views expressed by Mr. Williams, and, on behalf of the Institute, pleaded for a united profession—a profession trained on the same lines. He thought the proposal was bad for the school, hurtful to the pupils, and inimical to the interests of the pupil teachers.

A very successful Congress was brought to a conclusion by the usual reception, conversazione, and assembly, which was largely attended. The high standard of some of the papers, the large turn-out of members and the public, the absence of too much liveliness, all contributed to the success of the first Dumfries Congress. The local association has worked with evident and earnest zeal, with great enthusiasm, and with whole-hearted energy, and it must be gratifying to them to find their efforts so highly appreciated. Mention must be made of the admirable handbook—a real work of taste, some of whose illustrations we are enabled, by the courtesy of the publishers, to reproduce in this article—presented to the Congress by Messrs. Blackie and Son, and written by Mr. Waddell of Loreburn School.

GENERAL INFORMATION FOR SCHOLARSHIP.

IN our last issue we gave a general idea of the scope of the information required, and suggested one or two books of reference, and the kind of rough notebook for entering facts as they are gleaned. Our readers must, however, avoid the mistake of merely collecting facts without arranging them. Remember that "order is Heaven's first law," and the student who merely collects facts will often find that at the examination he will be able to recall no more about the subject of the question than that he has a note about it in his book. Arrangement is, therefore, necessary—not the alphabetical arrangement which is adopted in the encyclopædia for the sake of reference, but a systematic arrangement in order of subjects, and an endeavour so to set out each note that there may be a suggestibility about the fact that will lead to its recall on any required engagement. The student who wades through dictionaries and encyclopædias, and writes down promiscuous notes on everything, will soon make his mind a rubbish-heap. By cutting the corners of the notebook it may be used for notes on a variety of topics, each in its proper section. Such a number of subjects is included in the Scholarship Examination, that it is already an examination on general information; but omitting the subjects that are specifically named in the syllabus, we might suggest as suitable headings in the notebook—Politics; Military, Naval, and Social Matters; Trades and Manufactures; Mythology, Literature, Etymologies, and Quotations; and Inventions. In addition to these, there should be a portion set apart for matter not otherwise classified, but this should be kept down to the lowest possible limits.

Each month the student should read through a small book on some interesting and instructive subject, and be sure not to pass any point in it until thoroughly understood. Among these we might mention Macmillan's Primers (1s. each) on the History of Rome, of Greece, and of Europe, on Greek Antiquities and Roman Antiquities, and some of the Temple Encyclopædic Primers. Much valuable information will be gathered from the perusal of one of the little school-books on the Life and Duty of a Citizen. We recommend the study of such a book as the special work for this month.

Let us now give a suggestion for the mastery of matters of general information which are continually thrusting themselves upon us, but upon which we should find ourselves quite ignorant if we were called upon to submit to an examination. Suppose we are taking a walk in the High Street, how many things we shall come across which we have known long but not well! The first shop is kept by Mr. A, an "auctioneer." Are we quite sure of the exact meaning of this term, and of the scope of an auctioneer's work? Looking into our etymological dictionary, we find that the word comes from the Latin verb *augere, auctum*, "to increase." If you have never been to a sale by auction, go to the next one held in your neighbourhood, and you will learn the suitability of the name *auctioneer*, and possibly a few things besides. In such a sale the price offered for an article is gradually raised by successive bidders until no one is willing to offer more, and then the auctioneer taps his desk with a little hammer to declare the last bidder the purchaser. Hence the expression to send things "under the hammer" means to have them sold by auction. To conduct a sale in this way, it is necessary to have a licence, the cost of which is £10. No licence is required to conduct a "Dutch auction," which the derivation of the word *auction* shows not to be an auction at all. In this case the seller offers his goods—say a turkey—at a price far above their value, and then decreases it until he brings it down to what some one is willing to give.

The next shop is kept by B, C, and Co., Limited. Now the word "Limited" ought to recall that epoch in history associated with the "South Sea Bubble," when hundreds were ruined through the mania for speculation. In the case of a single individual who carries on a business, it is difficult to draw a line between the capital invested in the business and his other possessions; consequently the latter may be taken by his creditors in payment of his business debts. Formerly, if a person had ever such a small share in a joint business, he was liable to lose all he possessed to pay debts contracted in the business. Now the law allows any number of people, not less than seven, to join together in carrying on a business; and if each one has paid the money forming his share of the capital of the business (or bought the share of some one who has), he cannot be called upon to pay anything further. Such a company is obliged to use the word "Limited" after its name or title, so that people with whom the company may deal may know the condition of affairs, and exercise their discretion when asked to give credit.

The next shop is a public-house, and along the front we see "X Y, Importer and Bonder of Wines and Spirits;" and above, "N, M, and Co., Entire." We are not concerned with the correctness of Mr. X Y's description of himself, and the word "importer" is simple enough; but what is a "bonder"? Few, perhaps, of those who have seen that word thousands of times know exactly what it means; but how necessary it is to know something of our system of bonded warehouses in order to understand Walpole's policy, and the difficulty he got into with his Excise Bill. It is a well-known fact that wines and spirits improve by keeping; but if we suppose that the importer of a cask of wine were to pay the duty on it when it was first landed, he would have to charge a much higher price to his customers when he sold it, to make up for the loss of interest on the money which he paid for the duty. But the Government will allow the wine to be kept in certain warehouses called "bonded warehouses," and collect the duty when it is removed from them for sale. By this means the Government receives the same amount in duties, while the consumer does not have to pay so much as if the duties were paid on landing. A person who keeps goods in "bond" is called a bonder.

The word "Entire" implies that "N, M, and Co.," the brewers, are either the owners of the premises, or have advanced money to enable Mr. X Y to carry on his business, on condition that he shall sell their beer only.

The next shop is a pork-butcher's, and the only thing that calls for remark is the bill with the words, "Neat's-foot oil." The student may conclude that there is some connection with "neatherd," a minder of oxen, and that oil prepared from the feet of oxen may be bought here. This is the case, and the oil or fat obtained in this way is supposed to be particularly useful for softening leather. The word recalls what we have read in our grammar books, which point out that the names applied to dead animals are of Norman origin—*beef, veal, mutton, pork;* while the names of the living animals are of Saxon origin—*ox, cow, bull, calf, sheep, pig, sow:* which is accounted for by the fact that after the Conquest, and before the fusion of the races, the Saxons tended the living animals, while the Normans ate the flesh. And if we look further into this question, we see that the Norman names were only applied to the choice parts of the animal; the inferior parts were assigned to the Saxon servants, and down to the present have kept their Saxon names. Thus we speak of *neat's* foot, *cow* heel, *ox* tail and *ox* tongue (the two latter were not formerly regarded as delicacies), *pig's* head and feet, *sheep's* head and trotters, and *bullock's* liver.

CENTRE TEACHERS IN CONFERENCE.

THE present year will see great educational questions brought to the front, the most important of which will be, "Who is to control secondary education?" and "Is there to be a sharp line of demarcation between primary and secondary schools?" And to none of our educational institutions are these questions more vital than they are to the schools for pupil teachers. In order to equip our future teachers for their work, the education given in these schools is of necessity higher than elementary; while from the fact that School Boards, and other managers of elementary schools, are the employers of pupil teachers, and "are bound to see

that the pupil teacher is properly instructed during the engagement," it was only natural that pupil-teacher centres should be provided by the authorities responsible for elementary education. From this comes the peculiar position now occupied by pupil-teacher schools.

After the manner of other teachers, those engaged in the instruction of pupil teachers have long felt the necessity of uniting for common action in matters of common interest; and from this feeling has resulted, first, the establishment of three associations of centre teachers—one for the Metropolitan district, one for Wales, and one for the rest of the provincial centres; and second, the federation of these three associations into one body. This latter step was consummated on 3rd January, at a largely-attended and very representative meeting held at the offices of the N.U.T., kindly granted for that purpose. The meeting consisted of two sessions—that in the morning being assigned to the internal business of the Federation, while that in the afternoon was public. The officers for the present year are—president, Mr. R. Jones; vice-president, Mr. A. J. Arnold; secretary, Mr. Stone; committee, Messrs. A. E. Garrett, A. L. Cann, and R. D. Chalke. After the election of officers and the dispatch of formal business, it was resolved that the committee of the Federation should meet the committee of the Association of Principals and Teachers in Training Colleges, with the object of securing a correlation of the pupil-teacher course with that of training colleges. The evils arising from the present system have recently been dealt with in THE PRACTICAL TEACHER; and it was ably pointed out by Mr. Cann, who moved the resolution, that the abolition of the pupil-teacher examinations, and the liberty granted to training colleges to draw up their own syllabus, made united action imperative, if the course of training for teachers is to be one and not two. The Rev. Morley Stevenson, Principal of Warrington, and president of the Training College Association, stated that that association had already passed a resolution in favour of such joint action, and pointed out the weight that such combined effort should have with the Board of Education. It was suggested by Mr. Collar that the Scholarship syllabus should be drawn up on the lines of the Certificate syllabus—namely, with essential subjects forming Part I., and the others arranged in groups, so that the so-called optional subjects should really be optional, and not, as at present, compulsory on all who wish to take a good place on the list. The committee promised to try to give effect to this suggestion. The reduction in the number of subjects at the Scholarship Examination met with general approval, although great regret was expressed that School Method should be one of those omitted. Opinions were divided on the matter of the "General Information" paper; but it was generally felt that if the paper were carefully set, it would encourage wider reading and habits of keener observation among the pupil teachers; while if the questions were set on details of natural science and such matter, the paper would encourage guessing, and be worse than useless.

A letter was read from the Board of Education replying to complaints respecting the delay in issuing the Scholarship syllabus. The meeting felt that, owing to the frequent changes in the syllabus, it could not agree with the statement in the letter that the general scope of the examination was known, and that therefore it was unnecessary to issue it more than a year before the examination took place. From an examination point of view, many candidates for 1902 are bitterly disappointed that, whereas previous syllabuses had led them to suppose that they would receive credit for *two* languages, they will, in fact, be allowed marks for *only one*.

In the afternoon session the president gave a very interesting address, in which he dealt with the opportune moment at which the Federation had been formed, and after discussing the advantages and disadvantages that will attend the abolition of the annual collective examination, he proceeded to describe the educational outlook as rather a gloomy one. He described one head of the Board of Education as waiting for a breeze, and the other as being too fond of making changes. He advised his hearers to oppose changes unless there was a strong probability that the change would be for the better. It was very easy, he said, to criticise the pupil-teacher system. Formerly the complaint was that pupil teachers were too much *teachers*, now it was urged that they were too much *pupils;* and he advised his hearers to remedy this by keeping before their students the fact that they were learning in order that they might teach.

During the afternoon session some stimulating speeches were made by members of the N.U.T. Executive. Mr. Blacker spoke of the necessity for the teacher to acquire a good general training, and that culture which results from well-directed study, and also a sound professional training. Thus equipped, our elementary teachers would be able to take their stand with any others, and the profession would become one. Mr. Yoxall dealt with the professional outlook, and said that, in listening to the afternoon's speeches, he felt a spirit of optimism coming over him, and there were indications of ferment, change, and uncertainty in the near future. He regarded it as a good sign, as turmoil and conflict were signs of vitality, and therefore infinitely to be preferred to apathy and lethargy. He regarded the position of the elementary schools as perfectly stable, for the conflict would evidently take place in the plane above them; and it was evidence, he said, of the great power of the teachers of this country that they had been able up to the present to prevent the Government from setting up a separate authority to deal with secondary education, as had been done in all other European countries. He spoke in terms of high praise of the teachers produced by the pupil-teacher system in England, and said that they were superior not only in attainments and professional qualifications, but also in social status and political power. Mr. Coward congratulated the president on the practical character of his address, and was joined by Mr. Wild—who did not share Mr. Yoxall's optimism—in an appeal for united efforts in the field of educational labour. Towards the end of the session Mr. Gray made some important remarks on the registration of teachers, and the prospect of making the teaching profession a free and self-controlling body, and asked for information which would throw light on the relations between the pupil-teacher centres and the intermediate schools in Wales.

TYPES AND TEMPERAMENTS.

BY JOHN ADAMS, M.A., B.SC.

FEW teachers believe in phrenology, but most teachers would like to. What lends this pseudo-science its dangerous charm is the promise it gives of an easy and natural classification of our pupils. Teachers of large classes proclaim that they cannot study the individual child. Yet, as they feel the need of some sort of study of their pupils, they seek a short cut. Teachers are not content with the vague abstraction "the child," and they have no time to study the individual; so they compromise by dealing with *types*.

Every teacher has noticed, after having several classes pass through his hands, that there is a strange parallelism between one class and another. John Smith of the 1901 class irresistibly recalls Tom Brown of the 1900 class, or William Jones of the year before. Teachers interested in such matters sometimes amuse themselves by superimposing all the individuals of one class upon the shades of their predecessors. What serves for amusement may also serve for use. The study of types gives a real insight into the nature of the living children in our classes.

What the teacher feels about his class, thoughtful men have felt about their fellows, from the oldest times. The classification of men according to their temperaments goes back as far as Hippocrates and Galen. Their view was that the fundamental nature of a man depended upon the mixing in due proportions (*temperamentum*) of four fluids, all of which are present

in some measure in all human bodies. If the blood predominated, we had the *sanguine* temperament, characterised by love of movement, vivacity, light-heartedness, hopefulness, rashness, impatience. If the bile predominated, we had the bilious or *choleric* temperament, marked by ambition, stubbornness, love of work, courage. If the lymph was in the ascendant, the temperament was labelled *lymphatic* or *phlegmatic*. Its characteristics are, slowness of movement, dullness, incapacity for sustained effort, gentleness, placidity, lack of fuss. The old physicians believed in the existence of a specially virulent form of bile, called black bile. If this got the upper hand, the temperament was known as the *atrabilious* or *melancholic*, of which the marks were, depression, sadness, darksidedness, reflectiveness, and humility.

The humours have long ago passed down that broad way that leads to the resting-place of hypotheses. But the facts they were invented to explain remain, and so excellent is the classification that it has held its own up to our own times. Not only has it found favour with psychophysicists like Wundt, but it has commended itself to idealists like Kant and Lotze.

A double antithesis adopted by Wundt is very useful in clearing our minds from the mere literal meanings of the four names of the temperaments. Soul movements, he says, may be considered under two categories—(1) the energy of the movements; (2) the rapidity with which the movements succeed each other. According to the first category, the four temperaments fall into two classes—the *Strong* (that is, the Choleric and the Melancholic), and the *Weak* (that is, the Sanguine and the Lymphatic). According to the second category, the movements also fall into two classes—those marked by *rapid* movements (that is, the Sanguine and the Choleric), and those marked by *slow* movements (that is, the Melancholic and the Lymphatic).

However valuable these classifications are in themselves, many teachers want something much simpler for a working arrangement. Accordingly a simple double classification has been established, on the basis of the predominance of the sensory or motor functions of the organism. The child of motor temperament is marked by a very ready response to all stimuli. He is sometimes credited in books with a high degree of *motility*, which obviously means nothing more than that he has a strong tendency to let his energies discharge themselves in *deeds*. This is the kind of child that jumps at conclusions, and forthwith proceeds to act upon them. A child of strongly-marked motor type cannot help doing things, even when his teacher asks him merely to listen and consider. Knowing is for such a child only the vestibule of doing. The only use of knowledge is to suggest ways of acting.

The typical sensory child is content with receiving impressions, without at once responding to them or acting upon them. The inertia which marks this type frequently gives rise to a false impression of dullness. Such children are often slow at taking a hint, and are, generally speaking, slower at learning than the motors. Writers on this subject leave us with the impression that the sensory type is the higher of the two, and certainly the more intellectual. It is, therefore, hardly fair when one of the best-known of educational psychologists tempts us to discord by saying that, broadly speaking, girls are of the motor type. He soothes ruffled feelings by hinting that this difference between the sexes must be assumed to explain the relative dullness of boys at the earlier stages of education.

Perhaps the most scientific classification of the temperaments is that supplied by Alfred Fouillée. He combines the two classifications we have outlined. The Sensory and the Motor are each divided into two, and each of the four classes thus obtained corresponds to one of the four original types, as found in Hippocrates.

1. **Sensory**—with *prompt reaction* .....SANGUINE.
   Characteristics:—Pink complexion; skin in itself white; hair fair; eyes blue; neck short and broad; head round or squarish; nose big and strong.
2. **Sensory**—with *intense reaction*.....MELANCHOLIC.
   Characteristics:—Complexion pale; physiognomy expressive and mobile; light sleepers; hair either colourless, or darkens with age; neck long and thin; nose thin, with very mobile nostrils; body lithe, seldom fat; V-shaped face.
3. **Motor**—*prompt and intense*.....CHOLERIC.
   Characteristics:—Pale; olive or brownish skin; black and brilliant hair and eyes; body robust, but dry.
4. **Motor**—*slow and not intense*.....PHLEGMATIC.
   Characteristics:—Fattish; neck short; big nose; complexion without much colour, and no lustre; hair sparse, fair or light brown; beard absent or little coloured; eyes gray or green, without brilliancy.

This list of characteristics rouses as much envy as the phrenological heads that promise so much, if we could only believe in them. If we could but meet our class on the first morning with the list of characteristics in our hands, and arrange all the olive complexions, and green eyes, and V-shaped heads, what a saving of our time and temper. But we feel that all Fouillée's science will not save us from the weary round of bitter experiences with those variously-tinted eyes and differently-shaped heads, before we discover their inner meaning. There is no doubt a real relation between all Fouillée's characteristics and the accompanying temperament, but, with our present knowledge, we cannot depend on details.

Some teachers do make much more out of such physical peculiarities than others. An experienced teacher, of much common sense, maintains that a great deal can be learned from the nature and arrangement of the hair on a boy's head. (This particular teacher has no girl pupils.) With a new class he spends a little time going round their backs, nominally examining their exercise-books, but really investigating their hair. The texture of the hair has a meaning for him which he has never quite succeeded in explaining to other people; but his statement about the arrangement is clear and pointed. At the back part of the top of every boy's head is a spot that may be called the centre, round which the hair is arranged. Not unfrequently it is marked—to the boy's disgust—by a few rebelliously upright hairs. This teacher maintains that if you come across a boy with two such centres—a not uncommon feature, he says—you must prepare for trouble.

No doubt this teacher is right, in spite of our pity. He does learn a great deal from his quaint inspection. He learns, because he is interested and inspects at all. Just as this teacher learns many other things while he is looking for double-centred boys, so we may learn many other things while trying to arrange our pupils according to Fouillée's characteristics. We may learn, for example, what temperament means; for up till now

we have taken it for granted. There is a very common confusion between temperament and character. Now, temperament is a more fundamental thing than character: it conditions character; it is "given" in the problem of creating or modifying character. Temperament is "a foundation of tendencies which express the general manner of being of the organism, its mode of functioning, the tone, the value, and the direction of its vitality." It is the limitation placed upon mind or soul by the body. The teacher may use temperament for the best purposes or for the worst, but use it in some form he must.

It is sometimes said that we must aid our pupils to get the better of their original temperament. Here the word is loosely used, and is clearly confounded with the popular meaning of the word "temper," which, by a process familiar to those who study the history of words, has taken to itself an unpleasant suggestion of evil. To get rid of our temperament is as hopeless as it is undesirable. The child is not to be set free from his temperament; he is to be set free by it. It is the lever which the teacher must use in moulding character.

By classifying his pupils according to the types of temperament, the teacher gets a working knowledge of the basis of child nature in general, and at the same time cannot fail to gather a great deal of valuable knowledge regarding individual pupils. The commonplace pupils naturally attract no attention, which is not to be regretted, since they may be properly treated on general principles gathered from the study of types; while the very fact that certain pupils cannot be conveniently classified singles them out, and thus saves the teacher from the danger of using his general principles where they do not apply.

A UNIVERSITY CAREER FOR PUPIL TEACHERS.

BY FRANK J. ADKINS, M.A.,
Head-Master of the Higher-Grade School, Salford.

HOW many earnest teachers live laborious days, and devote their nights—which should be given to recreation and rest—to preparation for degree examinations, at a time when their mental activities have been worn and dulled by the strain of the day's teaching! How thankful these toilers are when they can escape from the thraldom; and what a blessing it would have been to them had they been enabled to get their degree before they left college, particularly if they could have combined their certificate with an Oxford or Cambridge degree! A man who has passed through the seats of the highest learning in the land should have a confidence in himself and in his opinions which ought to be of the greatest value to him in after life. He knows, or should know, that the view he takes of his work is the view not only of the specialist, but of the educated man as well. As England is just now painfully anxious to get a right view of her educational position, those who have at once the technical knowledge of the trained teacher and the general experience of the university man should command, some time or other, a very strong position.

There are probably few pupil teachers who would not welcome the chance of a course at Oxford or Cambridge, but most of them would probably say, if it were suggested, "Impossible! For one thing, it's too expensive; and for another, how could I get my certificate by going there?" Neither of these objections is fatal. To deal first with the last, it may be news to some that the Board of Education has recognised day training colleges at both universities, and that members of these colleges get £25 a year from Government towards their expenses. These students enter upon the usual three years' course—though some stay for four—and at the end of it gain, in practically every case, both their degree (often in honours), and at the same time their third year certificate.

The question of expense is a more difficult one, but one that has been met successfully by scores of pupil teachers during the past ten years.

There are two ways of becoming a member of the university—either by joining a college, or else by joining the non-collegiate body. The latter is the cheaper, and costs about £70 a year, whereas membership of a college costs an additional £30 or £40 a year; but this cost is only for the university terms. As vacations occupy nearly half the year, the cost of living in vacations must, of course, be allowed for.

The Government scholarship is thus seen to cover about one-third or one-quarter of the total cost; but in many cases members of the two day training colleges receive a sum equal to the Government scholarship from a fund managed by a Toynbee Hall Committee, which awards as many £25 scholarships as it can upon the result of an examination held in the February of each year.

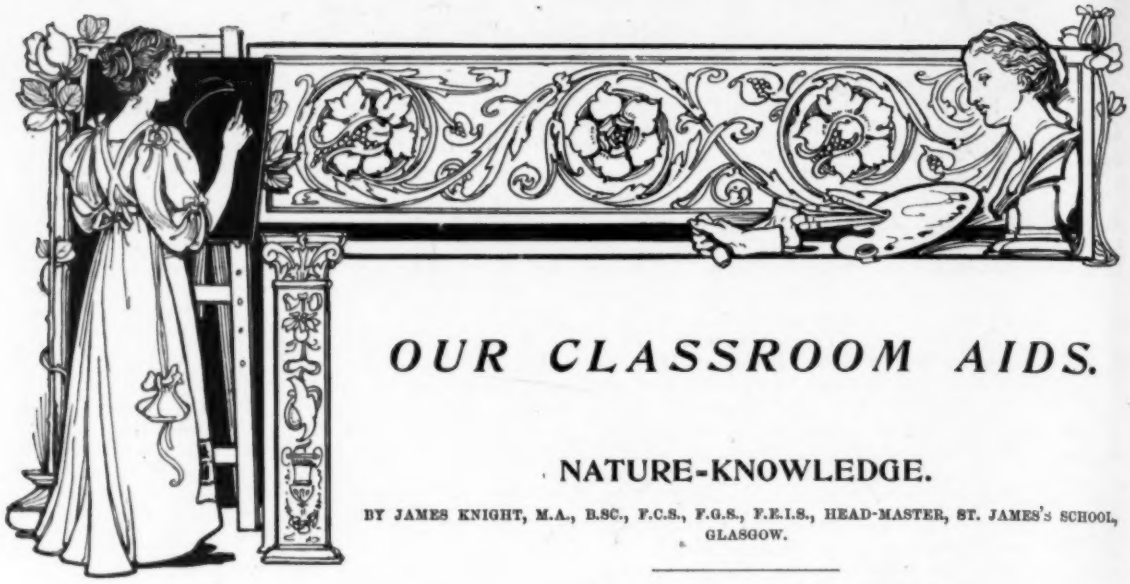
Application may be made at once to Mr. Baker, Secretary to the Committee, who will gladly supply information. His address is 28 Cautley Avenue, Clapham Common, London, S.W.

With £50 a year to his credit, a successful competitor who can command another £20 or £30 a year for three years may safely put his name on the university books; and, beyond these sums, he stands a chance of gaining a college exhibition or scholarship, either before commencing residence, or at the end of his first year as a non-collegiate student. Quite a number of men who spend their first year as "Non-Colls." win their way into college eventually. If, for instance, they do well in inter-collegiate examinations, they may find a college willing to offer them an exhibition or even a scholarship; and several colleges at both Oxford and Cambridge have offered exhibitions of £30, £40, and even £50 a year specially to day training college students, and may be expected to offer them again; while from time to time a well-prepared pupil teacher is able to win a sizarship or exhibition in the competition for open entrance scholarships, held usually in December by the various colleges.

Now as to the courses of study. Intending members of the Cambridge Day Training College should make up their minds to work for an honours degree by taking one of the several Tripos courses open to them. These courses are quite distinct from the poll course, and are not additions to it, as is the case at London University. A man preparing to take a Tripos—natural science, mathematics, modern languages, history, and moral science are the favourite ones with the Cambridge men—has only two examinations to pass. The first is the Little Go—or Previous, to give it its official name—and the only real difficulty to the pupil teacher in this examination is the Greek. But if anybody began directly after Christmas—when the King's Scholarship has been cleared out of the way, and festivities are a thing of the past—and worked steadily and entirely at his Little Go subjects, he should be able to get through the examination in the following October, or, at the latest, in the following December—that is, at the end of his first term. He will then have eight or nine terms—that is, the whole of his university course—clear for preparation for his Tripos, the only intervening examinations being unofficial, in the sense that they do not count as steps towards a degree, though of course it is most important to do well in them, as they are accepted by the Government as the non-technical parts of the certificate examination, and first-class success in them is also often rewarded with scholarships and exhibitions by the various colleges. Pupil teachers who have been through the advanced course of a science school would find themselves admirably fitted to begin the Natural Science Tripos.

To obtain a poll degree at Cambridge, three examinations have to be passed—the Little Go, the General (an elaborated Little Go), and the Special (an elementary Tripos).

There are, of course, many other aspects of a university course besides those touched on in this paper. I have aimed simply at giving a short summary of the facts which may be of use to a pupil teacher who, having reached the end of his apprenticeship, is considering the next step he should take.



OUR CLASSROOM AIDS.

NATURE-KNOWLEDGE.

BY JAMES KNIGHT, M.A., B.SC., F.C.S., F.G.S., F.E.I.S., HEAD-MASTER, ST. JAMES'S SCHOOL, GLASGOW.

PLANT LIFE: STEMS.

TO the man in the street, every part of a plant below ground is the root, and every part above ground the stem—the latter bearing buds, leaves, flowers, and occasionally branches as well, which behave like secondary stems. We shall have to extend and correct this popular notion by defining a stem as any part of a plant which bears leaves arranged in a definite order. And the term "leaf" must further be extended to include not merely the common green or foliage leaves, but also the coloured leaves which go to form flowers, and the brown scaly leaves which are seen at the base of every fern, and indeed on all underground stems. Stems are thus classified as floral stems, bearing the flowers; foliage stems, bearing ordinary green leaves; and scaly stems, mostly underground, and popularly classed as roots.

To show what is meant by bearing leaves arranged in a definite order, take a tall rose plant and mark with chalk the base of a leaf near the ground. Now run vertically up the stem till another leaf is reached exactly above the first, and mark this also. Next take a white tape, and, beginning at the leaf first marked, pass it spirally round the stem so as to touch all the leafstalks in succession, finishing at the second marked leaf. Now count how many turns the tape has made, and also how many leaves have been included, and it will be found in this case that three turns are required to reach a leaf exactly above the first, and that eight leaves are included in the series, which repeats itself when the second marked leaf is reached. This arrangement, which runs through roses, rasps, laburnums, poplars, and many others, is denoted by the fraction $\frac{3}{8}$, which may be read to mean either that the series consists of eight leaves in three turns, or that each successive pair of leaves is three-eighths of the circumference apart. In the same way, a branch of lime or elm shows the fraction $\frac{1}{2}$; alders, hazels, and beeches show the fraction $\frac{1}{3}$; oaks show $\frac{2}{5}$; roses, as already mentioned, $\frac{3}{8}$; spiræa, almond, and buckthorn, $\frac{5}{13}$; and so on. The numbers, in fact, form the well-known series of Bernouilli—1, 1, 2, 3, 5, etc., the next number being got by adding the two last; or they may be found by evaluating the continued fraction,

$$\cfrac{1}{1+\cfrac{1}{1+\text{etc.}}}.$$

It is a revelation for people to see that even in natural history, where one expects to find the free play of life, the reign of mathematical law holds good. What is the use of this exact arrangement? By observing an actual rose plant, or by drawing on the board a spiral with a leaf at every $\frac{3}{8}$ turn, it is easy to show that this arrangement gives every leaf its proper amount of space, and a just share of light and air; and this will be found to hold good of all the different systems.

This lesson in geometry has been taken from the foliage stem. In scaly stems the order is not so easy to trace, because the scales are often very small, or closely crowded together, as in onions and other bulbs; and the same objection holds good for floral stems. Still, a class has no difficulty in recognising a definite arrangement in, say, the scale leaves of a fir cone, although it takes very careful work to make out the exact fraction, in this case $\frac{5}{8}$.

In very many plants, such as woodruff, Robin-run-the-hedge, Canadian pondweed, etc., the leaves are arranged in whorls, each whorl springing from the stem at the same level, like the ribs of an umbrella. A very common arrangement is often seen in square-stemmed plants like the dead-nettle. A pair of leaves springs from the right and left sides of the stem, the next pair from the front and back, the third pair like the first, the fourth like the second, and so on alternately.

Coming now to underground stems which bear scale leaves, let us take a plant of mint and examine its stems from top to bottom. At the top there will be seen the short floral stems, crowded with small flowers; then there is the greenish foliage stem, square, and with the leaves in opposite pairs. Now take the plant out of the pot, and with the fingers gently remove the earth so as to expose the underground portion. Most of this will be found to consist of long, white, scaly stems, from which the true roots arise in the form of threads; and it is by means of these underground stems, rather than by seed, that mint spreads to the extent of becoming a garden pest.

Similar examples may be found in couch-grass, iris, coltsfoot, Solomon's seal, butterbur, and all the larger ferns and horsetails. Some of these show a division of labour in the shoots which they send up. Thus the coltsfoot, which is found in every cutting and embankment, first sends up scaly stems bearing the well-known yellow flowers; then when these die down, another set appears bearing large heart-shaped leaves. In the same way, the corn horsetail (*Equisetum arvense*), found by every roadside, first sends up in April fertile fronds with no leaves to speak of; then when these have done their work, the branched leafy fronds appear, and last through the summer.

Under the head of underground or scaly stems we must include bulbs, suckers, and tubers. Look closely at a potato plant freshly dug up, and it will be easy to distinguish the tubers from the true roots. Examine a single tuber, and look out for scale leaves, and for the little buds called "eyes," which lie in the axils of these leaves. The presence of these buds is alone sufficient to show that a potato tuber is really a swollen underground stem. Swollen with what, and why? Plant a potato, or get one that has been left in the ground, and observe what a rank growth of foliage stems has arisen from it, while the tuber itself has shrunk to about one quarter of its bulk. Explain, in connection with this, the method of raising potatoes, not from seed, but from cuttings of the tubers containing "eyes" or buds. To show a similar storage, get a last year's hyacinth bulb which has been lying past, and observe the formation of young bulbs at the expense of the old one. Show the same thing with onions and crocuses, and now draw the lesson about food storage. Some plants, called annuals, die down every year, and have to be sown, naturally or artificially, every season. Others, like the potato, live for two or more years. During their first year they produce no flowers or seeds, but confine their energies to storing up food, in the form of starch, fat, oils,

etc. If human thieves do not break through and steal, these stores are drawn upon next season, and the plant completes its life-history, bearing flowers, fruit, and seed. Very often this storage takes place in a taproot, as in carrots, beetroot, turnips, etc.; and everybody must have observed some of these plants shooting up to a great height and running to seed, as if they had somehow dropped a year out of their reckoning. This often happens after a late spring frost. The plant, so to speak, imagines that the second winter has come, and so, when the thaw arrives, it puts forth the energy properly due to a second summer.

Still, in connection with underground stems, examine some bulbs—onions for cheapness. Plant some in water, so as to show the true, thread-like roots. Make successive cross-cuts of an onion, to show that it consists really of rings of leaves, fleshy and white at the bases, brownish and scaly on the outside. Make a clean vertical cut through the main axis of a growing onion, to show the changes in the shape of the leaves, and the manner in which the young shoot springs from the bulb. Compare this with a hyacinth, in which the shoot, which seems to be central, is seen to spring really from the axil of one of these bulb leaves; compare it also with a crocus, in which the underground swollen stem, called in this case a *corm*, presents several points of difference from bulbs. All these swollen underground stems are intended to store food for next season, and to protect the young buds; they are therefore buried deep, so as to stand against frost, and they are, moreover, protected by scaly or gummy coverings.

Allusion has already been made to annual and biennial plants. Since an annual plant dies down in winter, its stem is but of one season's growth, and has no great weight to bear in the shape of branches. The parts are soft and green, with a spongy pith in the centre, and the stem is said to be herbaceous. Contrast this with the stem of a bush or a young tree, which has to last for several seasons, and observe in this case the presence of woody tissue in definite rings, as well as the outer covering of cork and bark, intended to check loss of sap, and to protect against frost. Even an annual stem has woody strands in it, the so-called vascular bundles, which appear in the leaves as ribs, veins, cords, nerves, as they have been called; but these bundles are isolated, whereas in a stem of some years' growth the woody deposits have grown into one another, forming a complete ring.

An important point appears in connection with the increase in growth of a stem. Take the branch of a tree and cut it across, and on cutting it will be found that the softer wood is on the outside, and the hard wood at the centre. Do the same with a bit of bamboo or any other foreign cane or grass, and it will be found that the hardest wood here is on the outside, while the centre is quite spongy. Further, a British tree shows, when cut across, the well-known annual rings of growth, by which therefore its age may be reckoned; whereas a cross-cut of bamboo or palm shows no such rings. Here, again, we are thrown back on the fundamental differences of plants, as already shown in their cotyledons, leaves, and flowers. Flowering plants which have two cotyledons or seed-leaves have leaves with branching veins, flowers arranged in fives or twos or multiples of these numbers, and their stems increase by addition to the outside, below the bark, forming successive rings. These are the dicotyledons or exogens, and they include nearly all our flowering plants except the lilies, orchids, irises, grasses, rushes, and sedges, as well as some water plants. All these last resemble the palm and the bamboo. They have one cotyledon, their leaves are parallel-veined and wither on the stem, their flowers are arranged in threes or multiples of this, and their stems increase by addition of new material within, so that the woody bundles are confused and scattered, instead of being arranged in rings.

The continuation of this lesson will deal with the mechanics of a stem, as shown in the arrangement of its woody bundles, with special forms of stems—creeping, running, climbing, parasitic, submerged, and floating stems—and also with the economic uses of stems, for timber, food, medicine, and the like.

A HIGHLAND TEACHERS' ART CLASS.

See the February Number of
THE PRACTICAL TEACHERS' ART MONTHLY.

PRICE THREEPENCE.

ARITHMETIC TESTS.

Standard IV.

CARD 1.

1. Multiply £64, 17s. 9¾d. by 69.
2. A farm of 296 acres is let for £428, 5s. 6d. Find the rent per acre.
3. A boy was born on 30th June, and his friend at a corresponding moment on 17th June. How many seconds older is he than his friend?

CARD 2.

1. Reduce 87 tons 15 cwt. 17 lbs. 11 oz. to ounces.
2. An addition sum of eleven lines amounts to £219, 5s. 1¼d. All the lines are alike. What is the sum of money in each line?
3. A farmer bought a cow and 37 sheep for one hundred pounds. He paid £2, 3s. 9d. for each sheep. What was the cost of the cow?

CARD 3.

1. A man gave away £782, 15s. 6d. in threepenny pieces. How many did he require?
2. Find the amount of three hundred and eight times four hundred and ninety pounds, thirteen shillings, and sevenpence farthing.
3. A piece of beef, at 9½d. per lb., cost £1, 7s. 8½d. How many stones did it weigh?

CARD 4.

1. What sum must be multiplied by four hundred and fifty-two to produce fourteen thousand three hundred and forty pounds, twelve shillings, and tenpence?
2. How many gallons, etc., are there in eighteen thousand and eighteen half-pints?
3. A grocer buys tea at 1s. 9½d. per lb. and sells it at 2s. 4d. How much does he gain on three cwt.?

CARD 5.

1. Find the value of 19 pieces of cloth, each 47 yards, at 8s. 7½d. per yard.
2. Reduce twenty thousand and nineteen farthings to pounds, etc.
3. A person uses 17 lbs. 9 oz. of tea in a year. There are five spoonfuls in one ounce. How many spoonfuls did he use in the year?

CARD 6.

1. Reduce £378, 16s. 11½d. to halfpence.
2. What is the ninety-seventh part of £94654, 8s. 4½d.?
3. If a halfpenny is 3 inches in circumference, how many times will it turn round in 59 yds. 2 ft. 9 in.?

CARD 7.

1. £13, 12s. 8½d. × 510.
2. How many half-pints are there in 276 gals. 2 qts. 1 pt.?
3. If a gentleman's income is five hundred pounds a year, and he saves £71, 2s. 6d., how much does he spend daily?

CARD 8.

1. If 574 articles cost £55043, 12s. 2½d., what is the price of each article?
2. How many minutes are there in October, November, and December?
3. A shopkeeper bought a chest of oranges containing one thousand four hundred and seven for a guinea and a half. If he sold them at a halfpenny each, how much did he gain?

CARD 9.

1. Reduce 5½ million ounces to tons, etc.
2. How many books, at 7s. 6d. each, could you get for twelve guineas and a half?
3. A man employs 17 men, 13 women, and 5 boys. Each man gets £1, 17s. 9d. per week, each woman 16s. 6d., and each boy 7s. 3d. How much would he have left out of fifty pounds after paying a week's wages?

CARD 10.

1. Find the cost of 39½ score sheep at £1, 17s. 9d. each.
2. A person's salary is £385, 2s. 6d. per annum. How much is that weekly?
3. How many lengths of 2 ft. 10 in. can be cut from 9 pieces, each measuring 85 yards?

CARD 11.

1. What is the value of 9 bush. 2 pks. 1 gal. 3 qts. at 4d. per quart?
2. How many persons can receive £5, 1s. 3d. each out of £2835?
3. A butcher bought 34 sheep and 38 calves for £417, 10s. Each sheep cost 50s. Find the cost of each calf.

CARD 12.

1. Find the sixty-ninth part of £14675, 4s. 5½d.
2. How many quarter-lb. packets can be weighed out of 17¼ cwt.?
3. A grocer bought eight hundred dozen eggs at 7½d. per dozen. He found 65 were broken. He sold the remainder at fifteen for a shilling. How much did he gain?

CARD 13.

1. Multiply 17s. 9¾d. by 738.
2. A dress takes 5¾ yards. How many dresses can be made out of 333½ yards?
3. What is the difference in price between a yard of velvet and a yard of silk, if 152 yards of velvet cost £93, 2s., and 79 yards of silk cost £43, 2s. 5d.?

CARD 14.

1. How many pints of beer will be required to fill 4876 nine-gallon casks?
2. How many dozen articles can be bought for £411, 10s. 6d., at 2s. 5½d. each?
3. A person's income is £96 per quarter, and he saves £1, 13s. 9d. weekly. What does he spend yearly?

CARD 15.

1. Divide £211419, 11s. 11½d. by 356.
2. How many drams are there in 3¾ tons?
3. What is the amount of 97 half-sovereigns, 58 half-crowns, and 246 halfpence?

CARD 16.

1. How much is 705 times three thousand and fifty-eight pounds, thirteen shillings, and eightpence farthing?
2. Reduce five hundred and seven thousand and ninety-eight seconds to weeks, etc.
3. A shopkeeper bought 177 books for £11, 8s. 7½d. and sold them at 1s. 6d. each. How much did he gain on each book?

CARD 17.

1. Bring ninety thousand and eighteen halfpence to pounds, etc.
2. To how many persons could £2, 5s. 4d. be given out of £346, 16s.?
3. A chest of tea containing 10 cwt. 3 qrs. 21½ lbs. was made into 258 packets. How many ounces did each packet contain?

CARD 18.

1. If six hundred and eighty-four horses cost thirteen thousand five hundred and nine pounds, what did one cost?
2. Find the value of 69 qrs. 5 bush. of flour at 1s. 5d. per peck.
3. How many seconds are there in the first three months of a leap year?

CARD 19.

1. Multiply £907, 15s. 6¾d. by 87.
2. How many 3 lb. parcels can be made out of 15 cwt. 48 lbs.?
3. The rent of a house is £7, 10s. a quarter, and the taxes are £5, 15s. a year. What is the total weekly cost?

CARD 20.

1. What amount must be multiplied by 153 to produce £56730, 3s. 4½d.?
2. How many florins are equal to 7568 half-crowns?
3. How many tons of soap must be sold at 3½d. per lb. to realise £130, 13s. 4d.?

CARD 21.

1. Multiply the difference between £578, 12s. 7¼d. and £713, 11s. 4½d. by two hundred and seven.
2. How much are three-quarters of a million farthings?
3. How many times can £7, 17s. 6d. be taken from £3433, 10s.?

CARD 22.

1. How many stones are there in 37 tons 18 cwt.?
2. How much will remain after dividing £586, 3s. 6¾d. among 87 persons?
3. What would be the cost for a year of 2½ pints of milk daily, at 4d. a quart?

CARD 23.

1. A farmer bought fourscore sheep for one hundred and seventy pounds and sold them at £2, 13s. 6d. each. What did he gain?
2. How many seconds are there in a leap year?
3. How many hurdles, each 4 ft. 8 in. long, could be made out of a fence 126 yards in length?

CARD 24.

1. Divide thirty thousand pounds by 357.
2. How many pints are there in 59 barrels, each containing 36 gallons?
3. What would a catch of ten thousand four hundred and twenty-three herrings be worth at 7 for 6d.?

CARD 25.

1. A man saves 4s. 9d. a week. How much could he save in five years?
2. Add together 274 shillings, 274 pence, and 274 farthings.
3. A clock loses 2 min. 36 sec. daily. How many seconds will it lose during the month of December?

ANSWERS.

CARD 1.

1. £4477, 9s. 0¾d. 2. £1, 8s. 11¼d. 3. 1123200 seconds.

CARD 2.

1. 3145243 oz. 2. £19, 18s. 7¾d. 3. £19, 1s. 3d.

CARD 3.

1. 62622 threepenny pieces. 2. £151129, 10s. 1d. 3. 2½ stones.

CARD 4.

1. £31, 14s. 6½d. 2. 1126 gals. 1 pt. 3. £9, 2s.

CARD 5.

1. £385, 2s. 1½d. 2. £20, 17s. 0¾d. 3. 1405 spoonfuls.

CARD 6.

1. 181847 halfpence. 2. £975, 16s. 4½d. 3. 719 times.

CARD 7.

1. £6954, 1s. 3d. 2. 4426 half-pints. 3. £1, 3s. 6d.

CARD 8.

1. £95, 17s. 10¾d. 2. 132480 minutes. 3. £1, 7s. 1½d.

CARD 9.

1. 153 tons 9 cwt. 22 lbs. 2. 35 books. 3. £5, 7s. 6d.

CARD 10.

1. £1491, 2s. 6d. 2. £7, 8s. 1¼d. 3. 810 lengths.

CARD 11.

1. £5, 3s. 8d. 2. 560 persons. 3. £8, 15s.

CARD 12.

1. £212, 13s. 8¼d. 2. 7728 packets. 3. £6, 15s. 8d.

CARD 13.

1. £657, 5s. 7½d. 2. 58 dresses. 3. 1s. 4d.

CARD 14.

1. 351072 pints. 2. 279 dozen. 3. £296, 5s.

CARD 15.

1. £593, 17s. 6d., and 94 farthings over. 2. 2150400 drams. 3. £56, 5s. 3d.

CARD 16.

1. £2156372, 9s. 8¼d. 2. 5 days 20 hrs. 51 min. 38 sec. 3. 2¼d.

CARD 17.

1. £187, 10s. 9d. 2. 153 persons. 3. 76 ounces.

CARD 18.

1. £19, 15s. 2. £157, 16s. 4d. 3. 7862400 sec.

CARD 19.

1. £78976, 13s. 11¼d. 2. 576 parcels. 3. 13s. 9d.

CARD 20.

1. £370, 15s. 8½d. 2. 9460 florins. 3. 4 tons.

CARD 21.

1. £27932, 5s. 6¾d. 2. £781, 5s. 3. 436 times.

CARD 22.

1. 6064 stones. 2. 3¾d. 3. £7, 12s. 1d.

CARD 23.

1. £44. 2. 31622400 sec. 3. 81 hurdles.

CARD 24.

1. £84, 0s. 8d., and 24d. over. 2. 16992 pints.
3. £37, 4s. 6d.

CARD 25.

1. £61, 15s. 2. £15, 2s. 6¼d. 3. 4836 sec.

THE INSPECTOR'S NOTEBOOK.

BY AN INSPECTOR OF SCHOOLS.

Registration Difficulties. IT sometimes happens that a boy who is present is inadvertently marked absent. How may this be rectified? I should be inclined to draw a decisive stroke through the nought with red ink, then place + 1 to the total, and at the bottom of the register write a brief note of explanation. Indeed, it is a good plan to write an explanatory note whenever corrections have to be made.

On another occasion, perhaps a boy, through answering twice, causes an absentee to be registered present. In that case you would cancel the stroke by drawing a ring round it, and place − 1 beneath the half-day's total.

If you have occasion to cancel figures, you should so do it that the cancelled figure is clearly visible.

Accuracy versus Intelligence. In spite of the powerful influence of the Old Guard amongst the teachers, in spite of the brave attempts of Board inspectors to continue individual examinations, and in spite of the foundation laid by years of Government inspection, with payment by results, it is reported that, at least in the metropolis, it is a case of *Facilis descensus in Averno*. Accuracy is being sacrificed to either looseness or so-called intelligence, say the croakers. Well, I agree that we do not get that rigid military precision that was customary in the past. Who wants it?

It is possible that the pendulum has swung too far. Why may we not obtain a reasonable amount of accuracy together with a due quota of intelligence? It is the happy mean again that we need.

Dictation versus Composition. Perhaps the falling off in accuracy is most noticeable in the case of spelling. In the old days the child who could do nothing else could spell. How could he help doing so, dosed as he was with daily dictation lessons and long lists of words to learn? Let us not forget, however, that full compensation for the falling off in spelling is obtained whenever the child is allowed to express his thoughts in writing. That is an exercise which demands intelligence, and, moreover, it affords ample opportunities for teaching spelling as well.

There is a tendency to treat the composition lesson rather lightly. It should not always be taken orally; in fact, it should almost invariably be a written exercise in the upper standards. I have seen excellent sentences written with pen and ink by the children of Standard V.

I find it a useful and interesting plan to show a class some object which I have with me—for example, a penknife—to encourage the Standard I. and II. children to talk about it to me, and finally to write on slate or book one or two sentences about the object. This may be varied by *doing* something before the little ones, asking two or three questions, and then requesting them to write one sentence on their slates.

Again, you might vary the lesson in this way: "Hands up all those (Standard I. and II.) children who have a cat at home." "You tell me what colour your cat is?" "Is it a cat or a kitten?" "What had it for breakfast?" "How did it drink the milk?" "Now write on your slates one sentence about your own cat; or if you have not a cat yourself, about your neighbour's."

The sentences should be corrected, and the misspelt words written correctly on the blackboard. Then the sentences might be rewritten correctly.

THE "NOTEBOOK" QUERY COLUMN.

Letters intended for this column should be addressed "Inspector," care of Editor, PRACTICAL TEACHER. Only in very urgent cases can replies be sent by post, and then only when two stamps accompany the letter.

Readers are invited to seek advice upon any question coming within the purview of schoolcraft.

F.H.—You will be able to sit for Part II. in 1902. Write for a syllabus of the examination to the Secretary, Board of Education, Whitehall, S.W. I advise you to work hard and sit in 1902. If you wait long, you stand the chance of getting rusty and out of trim for study. Strike the iron while it is hot.

L.T. has been an assistant under Article 51 for three years, being qualified through passing the Senior Oxford Local Examination. In the 1901 Code this examination does not qualify under Article 51 (*b*) unless "English" is "included among the groups in which the candidate has passed." L.T. wishes to know whether this addition is to be made retrospective.

If L.T. will look on page 42 of the Official Code, 1901, she will find as a footnote the following:—"Persons who pass before September 1, 1901, any of these examinations as specified in Schedule VIII. of the Code for 1899 or 1900, will be qualified for recognition under Article 51 (*b*)." She will be therefore qualified to sit in 1903, provided her age does not debar her.

Excelsior asks, "Is a pupil teacher bound to compete for the King's Scholarship Examination, or is he free to enter the Civil Service or take a University Preliminary or any other examination?"

The pupil teacher is bound to receive the instruction arranged for in his indentures, but could no doubt obtain permission from his managers to study and sit for a Civil Service or University Examination. The best way out of the difficulty would be to have the indentures cancelled, because so long as he is an apprentice the Board of Education would require suitable instruction to be given, and this would be a preparation for the King's Scholarship Examination.

M.H.C. is rather troubled as to the interpretation of Article 60, Schedule IV., of the Code. She asks: "Is the A.C.P. diploma, plus the certificate of practical ability to teach, equivalent to the Teachers' Certificate?" The answer is, "No."

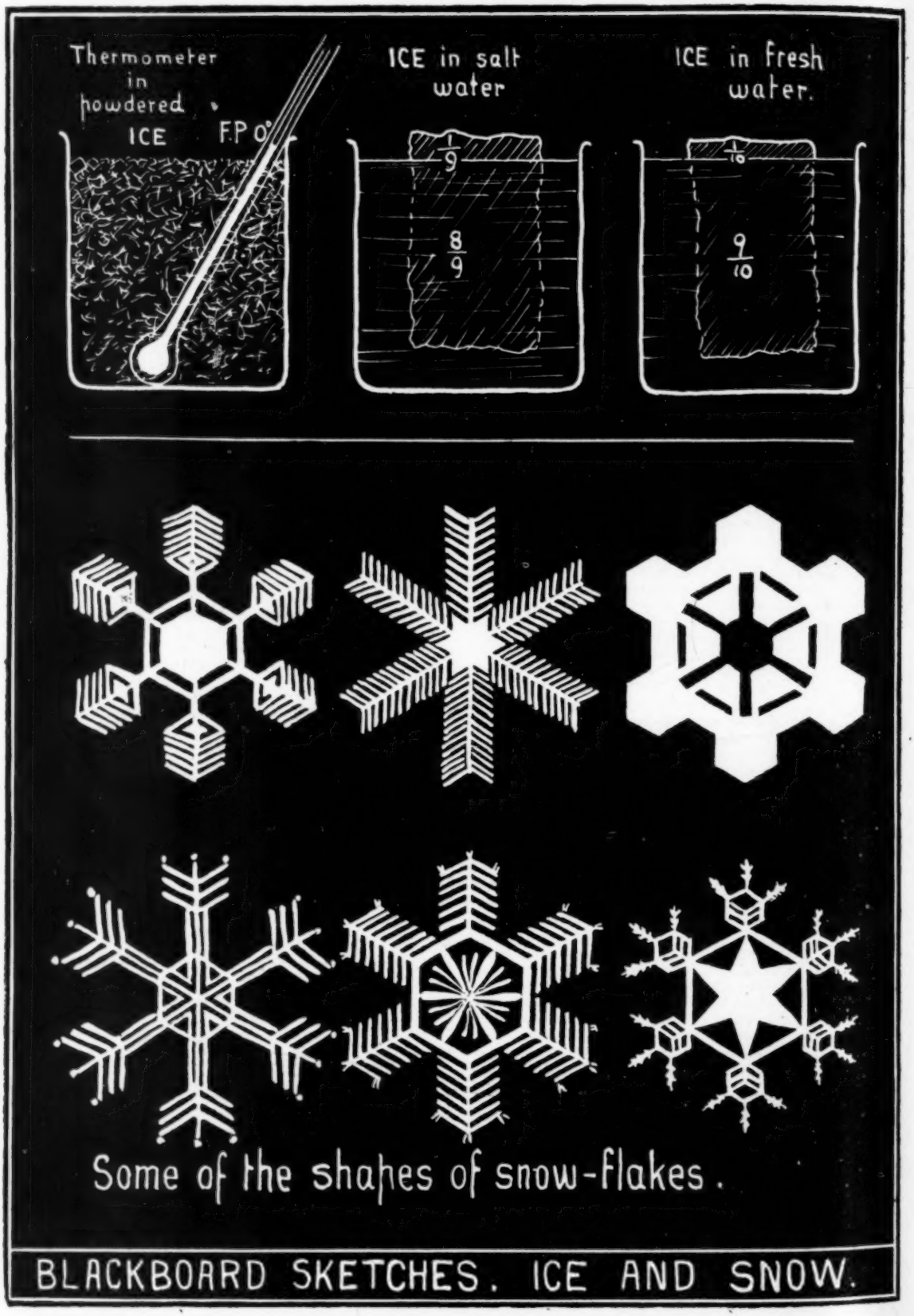
"If not, would the above, plus L.L.A. or F.C.P. or L.C.P., be sufficient?" The answer is, "No." M.H.C. cannot be recognised as a fully-certificated teacher without either passing the Certificate Examination or graduating in arts or science at a British university, and obtaining a certificate of proficiency in the theory and practice of teaching issued by a university or collegiate body recognised by the Board for the purposes of this Article. (See Schedule IV.) Of course M.H.C. is qualified under Article 51 (*b*) as an uncertificated assistant teacher.

Cyrwio desires to know which we consider the best training college. If we do not care to say, he asks us to tell him how he can find out.

Answer.—It is largely a question of individual taste. Is it a residential or day training college that Cyrwio wants? The London residential colleges are generally considered, on the whole, better than the provincial ones. Borough Road,

BLACKBOARD ILLUSTRATION.

BY C. ARMSTRONG, ART MASTER AND SOUTH KENSINGTON EXAMINER; PRINCIPAL OF ARMSTRONG'S DRAWING SCHOOL.



St. Mark's, Battersea, and Westminster are perhaps the best; but consult the certificate lists for results obtained.

Pompey.—I am very pleased to hear from you again. Your essay on "The Defence of War" is a good one. I should award you 70 per cent. of the total marks for it. Whilst your matter is excellent, there is a tendency to be a little too wordy occasionally, and in a few places the choice of word might have been better. However, on the whole, I note a decided improvement, and my 70 per cent. mark represents a severe standard. I am returning your essay, as you may want it.

J.H.B.—Your questions on registration are very useful. I deal generally with the subject in my notes, as you see.

A COURSE OF OBJECT LESSONS FOR GIRLS' SCHOOLS.

BY WILLIAM DONE, B.A.,
Head-Master of Brighton Pupil Teachers' School.

XVIII. ICE.

Articles of Illustration.—Pieces of ice; large bowl of water; piece of stout string or wire to suspend a weight of about three pounds; brad-awl and needles; tin can; some salt; thin glass bottle; spirit-lamp or candle; piece of soft clay.

Experiment and Observation.	Result or Inference.
1. Break a large piece of ice into small portions, so that each child may have one of them. See whether the girls can scratch the pieces of ice with— (*a*) their finger nail, (*b*) slate pencil, (*c*) knife or pen-nib.	Ice is hard, but may be scratched with a knife. Thin ice is transparent.
2. Let them lay the fragments on their hands and look through. Let them bite a little piece.	When scratched, ice shows a white mark. This is confirmed by recollecting the appearance of the ice on a pond after it has been skated upon.
3. Use a brad-awl to break a large piece of ice, and let some of the children break theirs with a needle.	Ice is brittle, and fractures in any direction.
4. Take the basin of water; place in it pieces of ice, chalk, and cork. Measure how much of the ice is immersed. Nine-tenths is beneath the water.	The piece of chalk is heavier than the same bulk of water, the cork is much lighter, while the ice is only a little lighter.
5. Take some pounded ice in a mug or a beaker. Place the bulb of a thermometer in it. Let a child read the thermometer, and compare with the reading of the thermometer used to record the temperature of the classroom.	The temperature of ice is 0°.
6. Let each child hold a very small piece of ice in her hand until it is melted. The teacher will meantime melt a small piece over a flame.	Heat turns ice into water.
7. Force a piece of ice into a lump of clay; melt it, and examine the space taken up by the resulting water.	Water takes up less room than the ice from which it was formed.
8. Take an ordinary medicine bottle or a piece of thin glass tubing. Fill completely with water, and close up tightly with a cork or by fusing. Take also equal quantities of pounded ice and salt to make a freezing mixture. Insert the tube or bottle of water. After about a quarter of an hour examine it. The water has been turned into ice, and the glass has been broken.	Cold will cause water to turn into ice. Ice takes up more room than the water from which it was formed. This is further confirmed by recollecting how pipes burst frequently when their contents are frozen. We can now account for the fact that ice floats in water.
9. Rest the two ends of a lump of ice on blocks of wood. Pass a thin wire round the middle of the ice, and pull it downwards by fastening a weight below. The wire will slowly pass through the ice, which will freeze up again above the wire.	The temperature of the cut surfaces being lowered by the loss of heat occasioned by the passage of the wire, caused the two surfaces to again freeze together.
10. Take a deep, narrow jar, or, preferably, a deep gas jar. Fill with water, and insert two thermometers, one near the surface and one near the bottom. Place the lower part of the jar in a mass of pounded ice, or ice and salt. After a short interval read the thermometers.	The colder water is nearer the bottom of the jar.
11. When the cooling has proceeded further, both thermometers will eventually show the same reading; and after the temperature has reached 40° F., or 4° C., the upper thermometer will begin to show a lower reading than the other thermometer.	After a temperature of 40° F., or 4° C., if water still goes on cooling, the colder water rises to the surface. Hence ice is formed at the top of ponds and rivers, and not at the bottom.
12. Ask for various suggestions as to what might happen if ice formed at the bottom instead of at the top of rivers, etc.	The fish would be killed. The ice would take longer to thaw again.

Some of the Uses of Ice.—Many of these will be supplied by the class, as—(1) to preserve articles of food by keeping down the temperature, and so preventing decomposition setting in; (2) to make cooling and refreshing drinks in hot weather; (3) to keep down the temperature of the human body when necessary in sickness, etc.

Where obtained.—Large quantities of ice are obtained from Norway, but our consumption is so great that a very great deal of the ice needed is made here artificially.

XIX. SNOW.

(To be given on a snowy day.)

Articles of Illustration.—Some snow; a good lens; drawings of snow crystals; a wineglass; a few fine feathers; piece of ice; spirit-lamp.

Experiment and Observation.	Result or Inference.
1. Place a thin layer of snow over the surface of a piece of printed paper; on another put a thin piece of ice, and a few drops of water on a third piece. Call attention to the fact that we can see the printed words through the water and the ice, but not through the snow.	Though water, snow, and ice are varying forms of the same substance, yet the water and thin ice are transparent, while snow is not.
2. Fill a small glass or test-tube with snow. Warm it over the spirit-lamp.	The snow melts, and the water takes up much less space.
3. Compare the rates of falling of— (*a*) Small piece of ice. (*b*) Paper. (*c*) Feather. (*d*) Drops of water. (*e*) Snowflakes.	A snowflake falls like a feather. It has a large surface for a small amount of matter.
If the particles of a large snowflake are so loosely held together, what fills the spaces between them?	In between the particles of a snowflake there must be much air.
4. Squeeze some snow tightly into a small ball. Note change of appearance.	The white colour disappears as the air is squeezed out. The little ball becomes more and more like a piece of ice.

[Teacher to help to draw con-

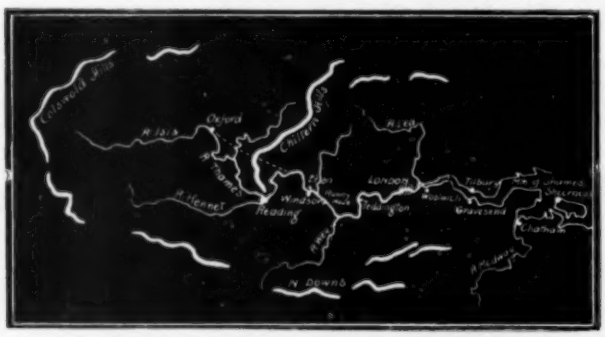
Experiment and Observation.	Result or Inference.	Experiment and Observation.	Result or Inference.
	clusion that the white appearance of snow is due to the air entangled in the particles, and is similar in origin to the white foam of sea waves, etc. The snow is thus composed of tiny particles of frozen water—the water vapour of the atmosphere.]	6. Show pictures of snow crystals.	Clusters of snow crystals are extremely beautiful. They are all grouped in hexagons.
5. Let the girls look closely at some large snowflakes through a lens. The snowflakes should preferably be placed on some dark material previously exposed to the cold air outside.	The overlapping of snow crystals may be seen. Here and there shapes of somewhat definite appearance are discernible.	7. Contrast the thin, powdery snow which falls in very cold, dry weather with the large flakes which fall in warmer, moister weather.	It was noticed that this thin, powdery snow was very difficult to make snowballs with; the particles would not stick together until squeezed for some time in the warm hand.
		8. Refer to the fact of snow covering the fields and preserving vegetation from the effects of severe cold. Recall to the girls' minds how Eskimos and others make snow huts.	The snow must be a bad conductor of heat.

HOW TO COMPILE NOTES OF LESSONS.

BY T. HUDSON, HEAD-MASTER OF KEPLER BOARD SCHOOL, LEEDS.

IV.—A GEOGRAPHY LESSON.

A GREAT change and a great improvement has of late years taken place in the teaching of geography. Formerly that was regarded as the most successful geography lesson in which the greatest number of facts was taught. They might be taught as isolated facts, unrelated to one another, or to the nature of the country or the character of the people; yet if they were known on the examination day, geography had been "excellently taught." Now we have a more excellent way. It is no longer regarded as of vital importance that every little bay or cape, mountain peak, or tributary of a river should be known by every child. Instead of the cram which formerly made the geography lesson distasteful, there is an earnest endeavour to teach the subject in a more attractive and rational way. This must be borne in mind by the young teacher when preparing the notes and giving the lesson. He must not overburden his lesson with too much unimportant detail. It will not do to treat the various sections of the geography lesson as isolated and independent. For instance, it will be necessary that the scholars should know the corn-growing and the grazing districts in England; but they should of themselves reason this out, after learning the nature and positions of the mountains and plains. In the following lesson, the scholars should suggest why the Thames does not take the shorter route to the sea, and why it makes the great bend to the south after leaving Oxford; also why there should be fortified places at the mouth of the Thames.



In giving a geography lesson, the teacher should endeavour to make a rough relief map in clay or sand, if one is not provided in the school. They are easily made, and give the scholars a much better idea of the district than a flat map. If the schoolroom is convenient, the teacher will find it an admirable plan to occasionally let the class form a circle, with the map laid flat on the floor in proper position—that is, the north of the map towards the north of the room. A sketch-map drawn on the blackboard before the class, with the various parts put in as they are taught, and thus being built up in front of the class, is much more valuable than an ordinary wall-map.

It is not necessary to give the lesson exactly in the order indicated in the notes. If the teacher prefers, he can begin at the source and teach all the facts mentioned in the "Matter" column, as they occur in travelling down the river to the sea. But even if this plan is adopted, the notes should be written as shown below, with the exception of a note in the "Method" column saying how the lesson is going to be taken.

NOTES OF A LESSON ON THE RIVER THAMES.

Class—Standard III.—Time—45 minutes.

Heads.	Matter.	Method.
Name, Size, etc.	1. The Thames is the most important river in England. 2. Called by various names, the chief being— (*a*) *Royal River.* Royal residence near it, and our most important river. Shows people's admiration. (*b*) *Father Thames.* A pet name. Shows people love it. (*c*) *Silvery River.* Shows the water is clear and bright (at least where name is given). 3. Though over 200 miles long, it is a small river compared with the large rivers in other countries.	1. Let a child point out the river on a map of England. 2. Tell. (*a*) Ask for reason, and refer to this when mentioning Windsor. (*b*) Compare pet names fathers and mothers give to their children, whom they love. (*c*) Let scholars tell what the name indicates. 3. Show comparative size on a map of Europe of Thames, Volga, Rhine, etc.

Heads.	Matter.	Method.
Source, etc.	1. Rises in the Cotswold Hills in Gloucester. 2. Its source is only about nine miles from the mouth of the Severn. 3. The springs which form the source of the Thames rise on the east slope of the Cotswolds. 4. The stream is at first a small one—called sometimes the Infant Thames. 5. It is called the Isis as far as Oxford.	1. Let children trace the river to its source. 2. Let a child move the finger (*a*) from source to mouth of Severn, (*b*) to the North Sea, and say which is the shorter route to the sea. 3. Let children give reason for river taking the longer route. 4. Contrast with name (*b*) in first head. 5. Show the Isis on a sketch-map. Write name on blackboard.
Course and Tributaries.	1. Flows mainly in an easterly direction. 2. After leaving Oxford it makes a great bend southwards. 3. It is diverted from its course by the Chiltern Hills. 4. At the southern extremity of the great bend it is joined by the Kennet. 5. Other tributaries are—Thame, Colne, and Lea, on the left bank; Wey and Medway, on right bank. 6. The district through which the Thames and its tributaries flow is the Thames Basin.	1. Children give the general direction. 2, 3. Draw the great bend on sketch-map, and ask scholars why it does not take the direction shown by the dotted line on sketch-map. Then put in the Chiltern Hills. 4. Put in on sketch-map. Write name large enough for scholars to see. 5. Draw on sketch-map. Let scholars say which bank they are on. 6. Let children point out on map. Show on relief map.
The Mouth.	1. The Thames opens out at the mouth into a wide estuary. 2. It is deep enough for large vessels as far as London Bridge. 3. Ships from all parts of the world may be seen going to and from London. 4. The mouth is well guarded by forts with cannons. They are to protect London.	1. Draw the mouth on sketch-map, and let scholars give name for wide mouth. 2. Tell. 3. Let scholars tell why we should see so many, and where they are going. 4. Let scholars give reason.
Towns, etc.	1. *Oxford.* Noted for its university. 2. *Reading.* Near the junction of Kennet and Thames. Noted for biscuits and flower-seeds. 3. *Windsor.* The castle is a royal residence. 4. *Eton.* Near Windsor, on opposite side of river. Noted for its school. 5. *Runnymede.* Where the Great Charter was signed. 6. *Teddington* = Tide-ending town. 7. *London.* The largest city in the world. Capital of England. 8. "*London's Watchdogs.*"	1. Mark on map. Refer to boat race. 2. Mark on map. Tell. 3. Refer to (*a*) in first head. 4. Mark on map, and tell. 5. Give a brief outline of this interesting event. 6. Having given the meaning of name, ask scholars why so named. 7. Mark on map. Children tell. 8. Mention the towns marked on sketch-map, if time permits.

OUR ILLUSTRATED GEOGRAPHICAL NOTEBOOK.

BRAZIL.

IN April 1500 a Portuguese squadron touched the north-east coast of South America. The admiral landed with troops, and after erecting a cross, took possession of the country in the name of his master, King Emanuel. The new country was first called Santa Cruz, but afterwards it received the name Brazil, from the red wood with which the regions abounded.

As gold and precious stones did not appear to exist, the Portuguese did not much value their new possession, and their ideas of colonisation were limited solely to transporting thither every year two shiploads of the most depraved criminals that Portugal produced, the vessels returning laden with parrots and dyewoods. This inauspicious commencement did not augur well for the future peace and prosperity of the new territory. After the lapse of nearly half a century, a large number of Jews were banished from Portugal to Brazil. The new settlers commenced the cultivation of sugar with canes procured from Madeira, and attention was drawn to the agricultural capabilities of the country. By the beginning of the seventeenth century Brazil was so flourishing that the French, the Spaniards, and the Dutch began to look with envy upon the claims of Portugal. The Dutch took possession of the country in 1624, and were in turn ousted by the Spaniards a few years later. In 1637 the Dutch began the conquest of all Brazil, and reduced seven of the fifteen provinces to submission. A peace with Portugal, however, confirmed the Dutch in their new possessions, and the Brazils were ruled jointly by the two countries. Constant quarrels occurred between the rival Europeans, and eventually the Dutch conceded all their interests and claims to Portugal for a monetary consideration. The Portuguese afterwards dominated the whole country, and remained undisturbed for over a century.

In 1698 gold was discovered, followed by diamonds some thirty years later, and by the year 1800 about 2,000 cwt. of gold and 2,000 lbs. of diamonds had been dispatched to Portugal. Portuguese government was synonymous with every imaginable administrative abuse. The natives were taxed heavily, and foreigners were placed under severe restrictions; grants of land were made to the younger sons of the Portuguese nobles, who ruled their territories by the most arbitrary methods; negro slaves were imported by thousands; and in every way wealth was extracted from the country with as little return as possible.

In 1808 the French invaded Portugal, and King John the Sixth and his court fled to Brazil, followed by a large number of emigrants. The monarch speedily took measures to improve the government of Brazil; but in 1820 he returned to Portugal, leaving his son Pedro as regent. From time to time the country was on the verge of revolution, and eventually in 1822 the National Assembly declared entire separation from Portugal, and Pedro was elected emperor. Portugal finally recognised this claim to independence in 1825. But even this did not bring peace to the distracted country; for, after incessant troubles, Don Pedro abdicated, and left Brazil in 1831. He was succeeded by his son, who was then only six years old; a regency was appointed until the young king was crowned in 1841. In succeeding years

the republican and revolutionary party gained considerable strength, until, in 1889, the king and his family were exiled, and a republic was declared under the title the United States of Brazil.

The *area* of the country is not less than 3,200,000 square miles, or very nearly equal to the whole of Europe. One half of the area consists of a huge plateau exceedingly well watered, with vast areas of dense primeval forests. The Amazon drains immense plains (*selvas*), extending from the Andes to the Atlantic.

The river Amazon, rising in Peru, is the mightiest river in the world, and from source to mouth has a length of 3,000 miles. By the time the Madeira falls into the main stream it is navigable, and attains a width of three miles, although it afterwards narrows considerably. Again it widens, with a depth of nearly 200 feet, and enters the sea by a mouth 180 miles wide. The area drained is 2½ million square miles, and the navigable waterways are quite 15,000 miles in length. The volume of water discharged is so great that for 300 miles from land the surrounding ocean is comparatively fresh. The counterpart of the Amazon is found only in the river Congo. These two rivers are strangely alike in that they drain immense fertile areas, each waiting for the occupation of man to yield produce enough to satisfy the needs of untold millions.

SKETCH-MAP OF BRAZIL.

Although only the extreme south of the country lies outside the tropics, the heat is not nearly so oppressive as in corresponding latitudes. The coast lands are tempered by the sea, and the interior benefits from the innumerable waterways and the forests, to which the trade winds render their beneficent aid.

Productions.—Nature has dispensed her favours with a prodigal hand, and there is scarcely a plant of economic value that cannot be grown in some portion of the country—coffee, sugar, cacao, maize, rice, wheat, tobacco, cotton, tea, and cocoa-nut. Mahogany and other cabinet woods abound; dye-woods and rubber are very general. The domestic *animals* of Europe thrive; the wild animals include the jaguar, the boa constrictor, and the alligator. The *mineral* wealth is very great, the country yielding gold, silver, copper, iron, and quicksilver. Brazilian diamonds are highly esteemed.

Occupations.—Agriculture is the principal industry. *Coffee* is the chief product; it is grown in the north-east, but Rio de Janeiro is the chief centre of cultivation. In 1909–1901 the total yield of coffee amounted to over 12,000,000 bags. Recently coffee has fallen considerably in value, and the cultivation has in consequence ceased to extend. The revival of coffee planting in Ceylon has also adversely affected the Brazilian product. *Sugar-cane* is grown in ever-increasing quantities. In Pernambuco there are thirty sugar factories, with an average capacity of 150 tons of cane daily. The northern provinces yield the best *rubber;* Para is the chief market. *Tobacco* is grown extensively, but especially in Bahia. In the Bahia and Pernambuco districts the *cocoa-nut* tree is found wherever there is a settlement. The nuts are gathered at all seasons, and are eaten by all classes, both when the nut is green and soft and in the ripe or hard state. So great is the demand for nuts for food, that only those that are left too long on the trees are utilised in the manufacture of copra or other by-products. It is strange that, notwithstanding plenty of uncultivated land, very few trees are being planted. To do this very little labour is entailed; a mature nut simply requires placing in the ground prior to the rainy season. In six years' time the tree will bear almost indefinitely. European cereals are grown successfully, and *cotton* is an important export. The forests contain almost illimitable wealth in the shape of cabinet woods and dye materials. *Mining* is important, and would become more so but for the lack of good fuel. The only manufacture of importance is that of cotton; there are one hundred and fifty *cotton mills* in the country, of which over forty are in the province of Rio de Janeiro.

Railways.—There are about 9,000 miles of line open to traffic, and several thousands more are under construction. The railways are chiefly in connection with the eastern ports, and extend but short distances inland. A huge railway scheme is afoot to connect North and South America *vid* Mexico, Central America, Colombia, Peru, Bolivia, and Argentine Republic; the capital required is estimated at £35,000,000. At present Brazil does not appear to be interested in the project, but there is no doubt the construction of such a line would have an important bearing upon the opening of the interior of the country.

Trade.—The latest trade returns are those for 1897:—

Imports.....	£21,500,000.
Exports.....	£26,700,000.

In 1900 Brazil took manufactured goods from the United Kingdom to the value of £5,800,000, and exported in return raw materials (chiefly cotton, coffee, sugar, and rubber) to the value of £5,900,000.

People.—The population of Brazil in 1891 was 17,000,000. Of these about one-third were whites, over two million Negroes, one and a quarter million Indians, and the remainder Mulattoes and mixed breeds of various kinds. The Europeans are chiefly found in the coast towns. Slavery was rampant until 1871, when an Act was passed for gradual emancipation. In 1885 a further Act attempted to hasten the process by the payment of compensation to the owners, but in 1888 slavery was finally abolished without compensation.

Considering the constant turmoil the country suffered for two centuries, Brazil has made astonishing progress. When the vast resources of the country are opened up by railways, there will be scarcely any limit to its possibilities. Wealth untold awaits only capital, strong hearts, and willing hands.

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OUR COMPETITION PAGE

OUR FRENCH AND GERMAN PRIZE COMPETITION.

Prize Editor—W. T. THOMPSON, B.A. (LOND.), *French and German Honours.*

Important to Scholarship, Certificate, and London Matriculation Students.

WE should like to specially direct the attention of our readers to the fact that the Board of Education, in the Syllabuses for the Scholarship and Certificate Examinations 1901 and 1902, requires "no set books" for French and German. Students preparing for these examinations, as well as students for London Matriculation, could not do better than attempt month by month the pieces set for translation here. They are from the best authors, and of varied character. A competitor who does not gain a prize can derive considerable benefit from the exercise. A study of the successful competitor's translation, and of our remarks, will help him to see where he might have done better. If desired, his paper can be returned (fully corrected) by enclosing six stamps together with a stamped and addressed envelope. Corrected papers cannot be posted until after publication of the journal.—ED.

RULES.

1. All translations should be **posted not later than February 10**, and addressed:—*Prize Editor*, Office of THE PRACTICAL TEACHER, 35 and 36 Paternoster Row, London, E.C.
2. Competitors should cut out and send the Coupon which appears on the Back Wrapper page of the current number.
3. Competitors should adopt a pseudonym, and send name and address written on a separate piece of paper.
4. No competitor may take the prize offered more than once in three months.

FRENCH PRIZE COMPETITION.

J'ai des passions très ardentes; et tandis qu'elles m'agitent rien n'égale mon impétuosité; je ne connais plus ni ménagement, ni respect, ni crainte, ni bienséance; je suis cynique, effronté, violent, intrépide: il n'y a ni honte qui m'arrête, ni danger qui m'effraye; hors le seul objet qui m'occupe, l'univers n'est rien pour moi. Mais tout cela ne dure qu'un moment, et le moment qui suit me jette dans l'anéantissement. Prenez-moi dans le calme, je suis l'indolence et la timidité même; tout m'effarouche, tout me rebute; une mouche en volant me fait peur; un mot à dire, un geste à faire, épouvante ma paresse; la crainte et la honte me subjuguent à tel point que je voudrais m'éclipser aux yeux de tous les mortels. S'il faut agir, je ne sais que faire; s'il faut parler, je ne sais que dire; si l'on me regarde, je suis décontancé. Quand je me passionne, je sais trouver quelquefois ce que j'ai à dire; mais dans les entretiens ordinaires je ne trouve rien, rien du tout; ils me sont insupportables par cela seul que je suis obligé de parler. Ajoutez qu'aucun de mes goûts dominants ne consiste en choses qui s'achètent. Il ne me faut que des plaisirs purs, et l'argent les empoisonne tous. J'aime par exemple ceux de la table, mais, ne pouvant souffrir ni la gêne de la bonne compagnie ni la crapule du cabaret, je ne puis les goûter qu'avec un ami; car seul, cela ne m'est pas possible: mon imagination s'occupe alors d'autre chose, et je n'ai pas le plaisir de manger.

J. J. ROUSSEAU.

RESULT OF THE DECEMBER COMPETITION.

The prize is awarded to "Kir," the pseudonym of Mr. Wm. Sturrock, Denhead Cottage, Kirriemuir.

First Class.—Lausanne, Oranienstein, Chemineau, L'ouragan, Sheila, Petit oiseau, V.H.T., H. R. Wiseman, Altiora peto, K.E.Y., Quod es esto, Pedagogue, Rustica, Z., Débutante, Oakover, Johanna, Polly, Espérance, Gringoire, Alberich, Ravenshoe, La Printanière, Sesostris, Whymark, Hundsfott, M.C.M., Echinops, Raton, Consuetudo, Clorinda, Kerboga, Marie I., Agaznog, Zoë, Tartarin, C.E.M., Bull-dog, Marwenne, Gwynne, Kettering, A plain woman, Marguerite, C.Q.X., Emile, Sinclair, Le coquelicot, Violet, Maud, L'anglais, A.E.G.W., Vert-Vert, December, Ruddigore, Iphigénie, Stella Vere, Lys d'argent, Ingomar, S.S., Nil desperandum, Raimeis, M.S.D., Myosotis, Red clover, Cyclops, Dinah, Alicia, Erimus, M.E., Petite, Roy, Ophir, Rainy day, Ephesian, Dinner time, Rosalind, Chaos, Gradus, Undine (Thorne), Poulton, Rajah, White Heather, Forget-me-not, Hélène, Latitus, La Normandie, Undine (Inverness).

Second Class.—Vouvry, Elyas, Ishpel, Indian John, Marie, Cuckoo, Kid, En avant, A Lancastrian, Irene, Trilby, Pearl, Iris, Italig, Lady Macbeth, Walsallonian, Mayflower, Rossignol, Llanroc, Lachie, Pudsey, War, Diana, H.W., Morganwg, Minnehaha, Werburgh.

Third Class.—Aspasia, Mother Redcap.

Report.

A large number of very creditable translations has been sent in this month. The most frequently recurring errors arise, as usual, from neglecting to grasp the piece as a whole. Hence *l'architecture des œuvres* is translated as "the structure of works," whereas the reference is merely to Zola's works. Again, *le travail est devenu plus facile, résultat dû à l'éducation* is rendered "education has rendered work easier," when the meaning is that Zola's practice in writing has made it for him a work of less labour to write a novel.* *Milieu* presented difficulties to some. Readers of Zola recognised in the term a reference to the influences of environment on mental and moral development.

Prize Translation.

From the outset, Zola's methods of composition show themselves to have been almost identical with what they are to-day. With the lapse of time, however, the structure of the plots has become involved. On the other hand, the style has become less laboured—a result due to experience.

When thinking out a novel, Zola always starts with one central idea. He proposes to study a phase of life, a social movement, or a class of individuals. For this purpose he first surrounds himself with such documents as will give him information and furnish him with ideas. He makes his own notes, for he has never employed and can never employ a secretary any more than he would accept collaborators, who could only give him an idea and would hamper him in working it out. He is usually obliged to make investigations on the spot, and on going home every day he takes notes of what he has seen. Jottings for descriptions, types of faces, scenes observed, are hastily noted in a few words which later on will serve to refresh his memory. From this time he occupies his mind only with his novel, and discards all reading which is not of service to the work on hand. At length Zola feels the necessity of drawing upon his reading, his observations, and his reflections. The work of creation begins. He seats himself at his desk with great regularity every morning, and composes what he calls the "rough draft." This is nothing else but a monologue which the author holds with himself. He states the general idea which dominates the work; then, step by step, he deduces from it the characters and the whole moral. He writes with the same object as others speak—namely, in order to think. Outside the hours regularly devoted to the task Zola attempts nothing; and no idea of importance occurs to him.

KIR.

* The translation which the successful competitor gives of this is rather a secondary than the original meaning.

The Practical Infant-School Teacher.

OUR MODEL INFANTS' SCHOOLS.

V.

WINTER is not a good season of the year in which to pay a visit to an infants' school for the purpose of interviewing and observation. It is true that the mistress has plenty of time to chat; but the children at work, *doing*, "oh where, oh where have they gone?"

This afternoon the snow lies on the ground to a depth of six inches at least, and, to make the matter worse, a thaw has set in. Some of the pavements are swept by thoughtful householders or broomboys, but in the majority of cases the snow lies there in all its dirty coating of smoke. The gutters into which the snow from the pavements has been shovelled are the worst parts of the streets, and no wonder the little children are kept at home, and the schools half empty.

But the interview must be made. The editor has commanded, and his will must be done.

The school is well worth a visit, and much can be learned from it. It lies in a suburb of a large Midland town, and has accommodation for three hundred and fifty children. There are six classrooms, three of which are built on each side of a magnificent and commodious central hall. Convenient cloakroom accommodation is provided at the end entrance, and at the other end there is a cloakroom used by the girls of the upper school, to which the infants' department is attached. The girls' cloakroom acts as a "buffer" between the two schools. The entrance and exit of the upper children through their own doors are seen through glass doors and windows of the dividing wall, but not heard. Communications between the master of the one and the mistress of the other can easily be made without inconvenience.

The cloakrooms are warmed, and the doors leading from them into the central hall are provided with pneumatic hinges which prevent them from closing with a slam, and which mercifully prevent little fingers from being pinched.

Two flights of steps, one on either side of the school, lead from the lower to the upper school, so that it is perfectly correct to say that the infants go "up" into the senior department when their transfer is made. At first sight of these steps one would naturally think some danger would be incurred by using them, especially as the light round and about is not very good; but one is assured, on inquiry, that no accident has as yet happened. The steps are a necessity, as the land on which the school is built has a rather steep slope. Indeed, in walking down the playground to the infants' department, the interviewer—called by the editor by the non-hybrid term commissioner—had some difficulty in keeping his equilibrium on the slippery snow.

Inside, the cold and wet were quite forgotten. The Plenum system of heating and ventilation seemed to be as near perfection as possible, and it was really very comfortable. Besides the atmospheric warmth, there were the hearty handshake and cordial welcome of the mistress, about whom more anon, and the evident happiness of the children, who were all at play. These certainly caused heart-warmth.

The children were at exercises—that is, they were dancing. The afternoons are almost entirely given up to this lighter vein of work, or to physical exercises, and only in the mornings do the children grapple with mental work—a remarkably good idea. For this condition of things many thanks are due to the representative of His Majesty the King, who encourages the teachers of this district to allow their little charges to "gyrate in dualities" as much as possible, and play such games as make fun. He does not believe in the stiff and tiresome games, which, if we only knew for certain, cause the little ones as much anxiety as their work, as much mental strain, and as much care. The dance is the "Lancers." Sets are arranged as in a ballroom, and the floor is nearly wholly occupied. There are no "wallflowers." The seven children that were out when the sets were formed were supplied by another child from a lower class, and so the set was completed. The way in which the separate stages or figures of the dance are remembered would give points to many people of older years. The teacher stands at a distance, and only has need to clap her hands when the figure is over, exactly as an amateur master of ceremonies plays his part. "How the children use their feet!" is the remark one feels bound to make; and "How perfect is the step!" one cannot help but say. "The light fantastic toe" is only heard. No heel dancing is seen.

The dance being ended, it is playtime, and the children arrange themselves in a ring, with teacher in among them. The dance is changed to a game—"Cat and Mouse." Again every child takes part, and the borrowed one is allowed to join hands with those for whom she had made the sets complete. Round and round they go, song accompanying the movements. Then two are chosen, one to play the "cat," and the other to play the "mouse." Mousie scampers off to avoid the chasing cat, and the children, entering into the reality of the game, help poor, poor mousie by making it as easy as possible for her to pass under their arms and in and out of the ring, while puss is balked and hindered in the chase as often as any chance of doing so is afforded. But as in real life, pussie proves the wiser, and by scheming, and watchfulness, and patience, pounces on the helpless little victim, and—here the simile ends. Mousie is not gobbled up, but released, so that others may become participators in the chase. "Hunt the Slipper," "Puss in the Corner," "Blind Man's Buff" are other games which the children know well, and evidently enjoy very much. It is related that, some little time ago, H.M. Inspector paid a visit to the school when games were in progress, and was charmed at the way in which the children played "Hunt the Slipper." He knew there was a slipper hidden somewhere among the children. He had seen it started, and had undertaken in his own mind to watch what became of it. But so dexterous were the children that he lost sight of it, and even from their faces and actions he could not locate the place where it was concealed. He expressed his intense enjoyment of the "splendid mendacity" of the children's unconscious expressions. But it is all pretence, and the beauty of it is that the children do not attempt to deceive in real work. They pretend fully and completely while at their play, but deceit, and copying, and such like offences are practically

unknown in the school. On the other hand, the tone of the whole establishment is particularly good.

If proof of this be wanted, it can be seen by the way in which the children change from a play lesson to one of real work. At one moment they are overwhelmed in fun, and at the next, by a mere hand signal, they are quiet and ready for whatever order is given. They realise the justice of discipline, and they understand that, just as they are allowed to frolic and give themselves up to fun in their games, so must they expect to give heart and mind to work when it is work they are set to do. At the moment of writing, a "quick change" artist is billed to appear at one of the music halls of the town. Here is an example of "quick change" children, and one needs not to go into the music hall to see how rapidly the change can be effected. A gong at the desk is sounded. Instantly, as though it had been anticipated, the assistant-mistresses of the classes in the classrooms appear at the doors and await a "desk order." The mistress expresses a wish—in this case, "Assemble in the hall for a special singing lesson"—and almost before it is possible to turn, the upper division of the school has filed into the hall, taken places, and is prepared for singing.

The piano is used for pitch. The note is given in chord form, and the following voice exercises are each taken in turn, first to the syllable ōō, then to the syllable ăh, and afterwards to the names of the notes:—

1. **d m s m d.**
2. **d m s m d' d' s m s m d.**
3. **d m s m f l d' l s t r' t d' d.**

The exercises are sung without the aid of the piano, and at the end of each exercise the pitch is tested. Such exercises are invaluable for correct voice production; for although the wrong sounds may be given when the notes are called by their proper names, **d m s**, etc., it is impossible to produce a wrong note when the sound ōō is made. A head note must be made. Little ones thus properly trained are sure to sing well.

A few songs are rendered with remarkable accuracy of pitch all through, although the afternoon was drawing to a close, and the children were not at their best for singing purposes. This shows the value of voice training, and it is a pity that more of it is not done throughout the country. The writer has been in many schools, and in seven or eight cases out of ten songs have formed the first and only part of a singing lesson. To those who adopt this method a better way is here pointed out—voice exercises to syllable ōō first. The children hear a correct note, become accustomed to it, and imitate it in actual song.

This is quite a musical school, and the songs attempted are quite difficult enough for little children. One of the song-books in use is Robert L. Stevenson's *Child Garden of Verses*, set to music by Mary Carmichael. It contains—"Where go the Boats?" "Fairy Bread," "Looking-glass River," and several other very pretty and suitable songs.

Two special features are noticeable in the organisation of this school, and mention is made of them before going into details of class instruction and methods of teaching:—

1. No slates are used.
2. No sewing or knitting is taught.

Both these points may be very unorthodox, but, after all, there is much reason in them. As regards the former, school publishers might suffer if every school in the country were to adopt the "no slate" system. Possibly buildings, or at least roofs, would be cheaper. Certainly the system inculcates no dirty habit among the children. The too common way of slate-cleaning, the somewhat common way of pouring water from a vessel on the slates and then expecting the children to rub them dry with their handkerchiefs, and the familiar and ready way of requiring the children to carry their own cleaning apparatus in the form of a damp sponge in an old tobacco-box, are completely done away with. No noise of slates falling, no noise of slates clicking each other and the desks, is heard. The possibility of children tilting their slates and using them at a wrong slope is also avoided; and inasmuch as no rubbing out can be done when only paper is used without its being at once detected and deprecated, the use of paper only is much to be preferred. It costs more per head for instruction, but not much, and the little extra cost is more than repaid by the health and cleanliness that are the consequent results.

As regards the "no sewing or knitting" arrangements, the mistress is following a wise course. But it is being carried out as an experiment for a time. If it works well, as far as the future abilities of the children are concerned, the system may be adopted in all the schools of the district. It is hoped that this *will* be the result. A year's experience is at hand. The teacher of the lowest class of the upper department was rather anxious as to her children's sewing, especially when not even needle drills had been learnt, and no stitches had been practised (see end of this article); but she has been thoroughly well satisfied, and is really glad that she could commence work without having to teach the unlearning of bad habits. The mistress is of opinion that however well sewing and knitting are taught to tiny children, it is altogether wrong to tax their too little fingers and their too little control of eyesight in doing it. She avers that needles and knitting-pins are not the things to put into the hands of little children. They are broken, they are used wrongly, and the children pore over tiny stitches when they ought to be using their eyes looking at larger things. As a set-off to "no needlework," an extended course of drawing and kindergarten is accepted.

It must be said here that this release from needlework is the result of strong advocacy with the members of the local School Board, supported by the inspectress of needlework, who is a sympathetic and earnest observer of infant child life. The mistress of this particular school is thoroughly trusted by the members of the Board, and has been allowed to make the experiment.

She is a strong advocate for, and well-wisher of, the little child. She always urges the good of the little ones before all things else. She is clever, too—an L.L.A. of St. Andrews—and a lady quite able to hold her own in debate at whatever meetings of school teachers she may attend; and whenever a deputation is appointed to wait on the Board, she is always chosen by her colleagues for that purpose. They know she will impress the Board by her straightforward manner, and by her outspoken and logically-expressed views. If anybody can convince, it is Miss ——.

The instruction of the children is carried on by the most approved methods. Every detail is carefully attended to, and although "Thorough" is not the recognised and adopted motto of the school, any one would imagine it to be so, for this word completely describes the work.

It will be noticed, on reference to the time-table, and an indication has already been made to this effect, that subjects which require mental concentration are taken only at the morning meetings of the school. Recreative lessons, such as drawing, pictures, kindergarten, and singing, are reserved for afternoons. The staff is, fortunately, pliable, and trained into one system of teaching. By means of criticism lessons (see note to time-table), conversations, and conferences, ways and means are practised and discussed. Experiments are made, and the results declared. Successful ones are adopted, while those that have proved to be of no value are discarded. Perfect understanding and unanimity are most noticeable, and the results are exceptionally good. Lessons are all carefully prepared, and no teacher would think of going to school without knowing exactly what was expected of her during the day. No time is spent in hunting out apparatus; it is all ready beforehand. The teaching is marked by brightness, and the children are trained to enter into the teaching as heartily as they do the learning. Questions by them are always treated as inquiries after knowledge, and the children are urged to answer each other's questions. This is a splendid way of bringing out and increasing what is already known. It is training *par excellence*. The answers to questions are made in sentence form, and occasions have arisen when quite long sentences have been made by very tiny children.

As regards the elementary subjects, let us specialise in arithmetic. It will be typical of the thoroughness of the teaching of all.

At the very commencement numbers are taught as wholes by means of number pictures. Each number is represented

in a particular way, and always in the same way, so that the children learn to visualise the number and work mentally by its means. Dots on the blackboard, balls, tablets, bricks, and other apparatus are afterwards used for the purpose of decomposing the numbers. The balls, tablets, etc., are handled by the children and arranged by them in groups of three, five, or any other number, and so facility in dealing with them is quickly acquired. The four rules are taught together, also halves, doubles, counting by twos, threes, fours, etc., beginning with any number. When ten is reached and numbers are added, each number is counted as part of another ten till twenty is reached, and so on. Hence no difficulty with units and tens crops up. Adding and subtracting are done by means of tens and parts of tens. Eight and seven (fifteen) are eight, and two, and five. Every point is mastered before another is attempted. A very ingenious aid to the teaching of addition is in use. It consists of a wooden frame, which stands on two little feet, on a table, in view of the children. It has a solid back, on which are fixed little platforms one above the other. On these platforms objects can be placed in the same positions as those used by the children on the desks; and the *form* is seen correctly, not altered by the perspective, as it would be were the teacher to demonstrate with a flat surface. Each frame contains ten platforms—five above five. When numbers are mastered thus far, a second ten is built up by the side. The children are thus taught the synthesis and analysis of numbers as tens or parts of tens. Number is consequently a very strong point in the elementary part of the school curriculum. All test sums are given in concrete form orally, and worked mentally. The children are taught to make their own problems or puzzles.

Knowledge lessons consist of object lessons and conversational lessons. The illustrations on the blackboard are of the simplest character, such as the children can copy afterwards for themselves. The conversational lessons are from pictures and imagery. In every case composition forms an after lesson, and, when possible, this is illustrated by the children's own drawings. To aid the teaching, the school contains a fairly-filled museum, which is in constant use.

The following is the complete scheme of object lessons:—

FIRST AND SECOND CLASSES.—HIGHEST.

Group I.—Bird Life.

(*a*) Song Birds. Types—the robin and the lark.
(*b*) Birds of Passage. Types—the cuckoo and the swallow.
(*c*) Domestic Birds. Types—the fowl and the pigeon.
(*d*) Swimming Birds. Types—the duck, the goose, and the swan.

(*Note.*—The country is near, farms are plentiful, and at a neighbouring park the children can observe and feed the swan on the lake.)

Group II.—Insect Life.

(*a*) The Silkworm. Structure of the moth. Growth from the egg.

(*Note.*—Silkworms' eggs are given to the children in the spring of the year, and a considerable quantity of silk is obtained by the children from silkworms of their own rearing and tending.)

(*b*) The Bee. Structure compared with that of silkworm moth. Growth, etc. The beehive.
(*c*) The Butterfly. Comparisons between butterfly, bee, and silkworm moth.

Group III.—Plant Life.

(*a*) Parts of a typical plant, and functions of each.
(*b*) Trees in spring, summer, autumn, and winter (in seasons).

THIRD AND FOURTH CLASSES.—MIDDLE.

Group I.—The Farm.

(*a*) Its buildings, and what they are for.
(*b*) The Horse. Special reference to his work on a farm.
(*c*) The Cow. The Dairy.
(*d*) The Pig.
(*e*) The Sheep.
(*f*) Fowls.
(*g*) Ducks and Geese.
(*h*) The Dog (watch-dog and sheep-dog).

Group II.—The Garden.

(*a*) Work in a garden.
(*b*) Garden tools and their uses.
(*c*) The life of a plant.
(*d*) The garden in the seasons.
(*e*) Animal life in the garden (birds, the snail, the earthworm, the caterpillar, the butterfly, frogs and toads).

FIFTH AND BABIES' CLASS.

Simple lessons made into play from the two foregoing schemes.

For the kindergarten lessons the "gifts" are entirely in use, and games are included. Some very pretty work is done in the tablet-laying section. This forms an instructive and helpful introduction to design. Clay modelling and brushwork are taken in the two highest classes. The time-table (with notes) is appended.

TIME-TABLE.

Class.	9 to 9.10.	9.10 to 9.30.	9.30 to 9.35.	9.35 to 10.5.	10.5 to 10.35.	10.35 to 10.50.	10.50 to 11.20.	11.20 to 11.50.	11.50 to 12.	Day.	2 to 2.25.	2.25 to 2.30.	2.30 to 3.	3 to 3.30.	3.30 to 3.45.	3.45 to 4.30.	4.30 to 4.50.
1.	HYMN, PRAYER, AND MARKING REGISTERS.	SCRIPTURE.	REGISTERS FINALLY CLOSED.	Number.	Writing.	RECREATION.	Word Bdg. or Dictation.	Reading.	DRESS AND DISMISSAL.	MONDAY.	SINGING.	REGISTERS FINALLY CLOSED.	Phys. Exer.	Kindergarten.	RECREATION.	Songs.	DRESS AND DISMISSAL.
2.				,,	,,			,,					Drawing.	Recitation.		,,	
3.				,,	,,			,,					Phys. Exer.	Picture Less.		Kindergarten.	
4.				,,	,,			,,					Picture Less.	Phys. Exer.		,,	
5.				,,	,,			,,					,,	,,		,,	
1.				Number.	Obj. Lesson.		Reading.	Writing.		TUESDAY.			Drawing.	Phys. Exer.		Picture Less.	
2.				,,	,,		,,	,,					Phys. Exer.	Picture Less.		Kindergarten.	
3.				,,	,,		,,	,,					Drawing.	Phys. Exer.		Songs.	
4.				,,	,,		,,	,,					Phys. Exer.	Drawing.		,,	
5.				,,	,,		,,	,,					,,	,,		,,	
1.				Number.	Writing.		Word Bdg. or Dictation.	Reading.		WEDNESDAY.			Phys. Exer.	Kindergarten.		Songs.	
2.				,,	,,			,,					Drawing.	Phys. Exer.		,,	
3.				,,	,,			,,					Phys. Exer.	Picture Less.		Kindergarten.	
4.				,,	,,			,,					Picture Less.	Phys. Exer.		,,	
5.				,,	,,			,,					,,	,,		,,	
1.				Number.	Obj. Lesson.		Reading.	Writing.		THURSDAY.			Drawing.	Phys. Exer.		Picture Less.	
2.				,,	,,		,,	,,					Phys. Exer.	Picture Less.		Kindergarten.	
3.				,,	,,		,,	,,					Drawing.	Phys. Exer.		Songs.	
4.				,,	,,		,,	,,					Phys. Exer.	Drawing.		,,	
5.				,,	,,		,,	,,					,,	,,		,,	
1.				Number.	Writing.		Word Bdg. or Dictation.	Reading.		FRIDAY.			Drawing.	Recitation.		Conversation. Oral Compos.	
2.				,,	,,			,,					,,	Phys. Exer.		,,	
3.				,,	,,			,,					,,	Recitation.		,,	
4.				,,	,,			,,					,,	,,		,,	
5.				,,	,,			,,					,,	,,		,,	

NOTES.—1. A criticism lesson, at which all the teachers are present, is given on the first Tuesday in each month, at 11.30. For this purpose all classes except one are dismissed at 11.30. Occasionally a model lesson takes the place of the criticism lesson.
2. Registers are marked at 9.5 a.m. and 2.15 p.m., and finally closed at 9.35 a.m. and 2.30 p.m.
3. The time-table for the babies is similar to the above, but the lessons are shorter and more varied.

SUMMARY OF TIME-TABLE.

SUBJECT.	Class 1.	Class 2.	Class 3.	Class 4.	Class 5.
Scripture	125	125	125	125	125
Reading	150	150	150	150	150
Spelling and Dictation	90	90	90	90	90
Transcription	150	150	150	150	150
Mental Arithmetic and Tables	150	150	150	150	150
Recitation	80	80	80	80	80
Singing	145	145	145	145	145
Object Lesson	60	60	60	60	60
Kindergarten	60	70	60	60	60
Drawing	90	90	90	90	90
Physical Exercises	120	120	120	120	120
Recreation	150	150	150	150	150
Registration	75	75	75	75	75
Picture and Conversational	105	95	105	105	105
Dress and Dismissal	100	100	100	100	100
Total number of minutes	1650	1650	1650	1650	1650

NEEDLEWORK AND KNITTING DRILLS FOR INFANTS' SCHOOLS.

In the preceding article mention is made of the children being allowed to omit all needlework and knitting. Even the drills are excused, and it may fairly be asked to what extent (if any) do the children suffer. To show this, we print a Code of Drills which is in use in the schools under the same School Board authority.

As regards the Needlework Drill, Steps I. to III. are practised with the babies, Steps I. to VI. with Classes 3 and 4, and Steps V. to VII. with Classes 1 and 2; while as regards the Knitting Drill, Steps I. and II. are practised with the babies, Steps II. and III. with Classes 3 and 4, and Steps V. and VI. with Classes 1 and 2.

The drills are intended to teach the children the various positions of pins, cotton, etc.; and teachers are advised to spend at least five minutes at the commencement of each needlework lesson at drill. The monotony of the lesson is relieved, and the children's fingers become pliable by constant practice. It is necessary that care should be taken to see that the children hold their pins, turn their cotton over, etc., correctly, otherwise the drills are worse than useless.

In sewing, the cotton must be passed between the third and fourth fingers, and not drawn through the hand.

With these instructions, if carefully attended to, it is safe to put the drills into the hands of even the youngest pupil teachers. They cannot help producing good results.

A NEEDLEWORK DRILL.

Step I.—Needle Drill.

Hands ready.—One. Show left hand.
Two. Show needle in left hand.
Three. Show right hand.
Four. Show cotton in right hand.
Five. Ready.
Six. Thread needle.
Seven. Show.

Step II.—Thimble Drill.

Hands ready.—One. Show right hand.
Two. Show middle finger.
Three. Show left hand.
Four. Touch thimble.
Five. Put it on.
Six. Show.

Step III.—Position Drill.

Ready.—One. Show needle threaded.
Two. Show thimble.
Three. Place needle.
Four. Place thimble.
Five. Place cotton.
Six. Show.

Step IV.—Work Drill. Hemming.

Hands ready.—One. Touch hem.
Two. Touch right-hand top corner.
Three. Move from right to left.
Four. Show work finger.
Five. Hold right-hand top corner.
Six. Place work on finger.
Seven. Show.

Step V.—Work Drill. Seaming.

The same caution and commands as in Step IV. (hemming), but on *six* the work is placed differently.

Step VI. Stitch Drill. Hemming.

Hands ready.—One. Show needle.
Two. Show work.
Three. Make a stitch.
Four. Turn the work over, and see if the needle can be seen.
Five. Turn work back again.
Six. Touch the eye of the needle with the thimble.
Seven. Hold the point.
Eight. Pull it through.

Step VII.—Stitch Drill. Seaming.

The same caution and commands as in Step VI. (hemming), but omit commands *four* and *five*.

A KNITTING DRILL.

Step I.—Needle Drill.

Hands ready.—One. Show right-hand needle.
Two. Show left-hand needle.
Three. Make a cross.
Four. Show cross.
Five. Ready.
Six. Change cross.
Seven. Open cross.
Eight. Attention.

Step II.—First Stitch Drill.

Hands ready.—One. Show cotton.
Two. Make a loop.
Three. Drop cotton.
Four. Touch needle.
Five. Lift cotton.
Six. Tighten stitch.
Seven. Show stitch.
Eight. Attention.

Step III.—Second Stitch Drill.

Hands ready.—One. Put needle into loop.
Two. Ready. (Needle in left hand; cotton over first finger of right hand, under two middle fingers, and over the little finger.)
Three. Turn cotton over.
Four. Ready. (Fingers on needles.)
Five. Lift stitch up.
Six. Lift stitch on to other needle.
Seven. Show.

Step IV.

Knit on twelve stitches.

Step V.—First Row Drill.

Show twelve stitches.—One. Put needle in loop.
Two. Show.
Three. Turn the cotton over.
Four. Ready.
Five. Lift the stitch up.
Six. Lift the stitch off.
Seven. Knit remaining stitches.

Step VI.—Chain Edge.

Ready.—One. Needle under cotton.
Two. Needle through front of loop.
Three. Stitch off.
Four. Cotton between needles.
Five. Knit all stitches off.

Step VII.—Casting-Off.

Ready.—One. Knit two stitches.
Two. Pass first stitch over.
Three. Repeat.

THE FAIRIES.

(From Nelson's "Infant School Song-Book," No. 1.)

Introduction and Interlude.
Ver. 5. Is
KEY E♭.
Up the air - y moun - tain, Down the rush - y glen; We dare - n't go a -
Refrain.
hunt - ing For fear of lit - tle men. Wee folk, good folk,
Ver. 3. All
Ver. 5. In his
Troop-ing all to - geth - er; Green jack - et, red cap, And white owl's feath - er.
Interlude ad lib.

THE FAIRIES.

1. Up the airy mountain,
Down the rushy glen,
We daren't go a-hunting
For fear of little men.
Refrain.—Wee folk, good folk,
Trooping all together;
Green jacket, red cap,
And white owl's feather.

2. Down along the rocky shore
Some make their home;
They live on crispy pancakes
Of yellow tide foam.
Wee folk, good folk,
Trooping all together;
Green jacket, red cap,
And white owl's feather.

3. Some in the reeds of
The black mountain lake,
With frogs for their watch-dogs,
All night awake.
Wee folk, good folk,
Trooping all together;
Green jacket, red cap,
And white owl's feather.

4. By the craggy hillside,
Through the mosses bare,
They have planted thorn-trees
For pleasure, here and there.
Wee folk, good folk,
Trooping all together;
Green jacket, red cap,
And white owl's feather.

5. Is any man so daring
As dig them up in spite?
He shall find their sharpest thorns
In his bed at night.
Wee folk, good folk,
Trooping all together;
Green jacket, red cap,
And white owl's feather.

6. Up the airy mountain,
Down the rushy glen,
We daren't go a-hunting
For fear of little men.
Wee folk, good folk,
Trooping all together;
Green jacket, red cap,
And white owl's feather.

This is a charming song, and is suggestive of many nice actions. The *mountain* may be shown by the hands, so ∧, and the *glen*, so V. The *wee folk* may be measured by the hands, which may also be held so as to indicate fear; their dress and bearing may be pointed out; the *planting* and *digging up* of the trees may be imitated; and the *trooping all together* may introduce a quick march movement of the feet, etc.

NEW RECITATIONS FOR THE INFANTS.

I. THE TALE OF A CHICK.

ONCE a fluffy little yellow-feathered chick,
With a pair of beady eyes quite remarkable for size,
And a mother whom he teased
Into doing as he pleased,
Peeped one morning through a chink
In her wings, and then I think
That he spoke within himself in this wise,—

"What a big and what a pleasant-looking world!
What a splendid golden sun! why, the day is quite begun!
And I fain would be about
While the early worms are out.
These old-fashioned fowls are lazy,
I'm as fresh as any daisy,
And it's just the sort of weather for a run."

Then this fluffy little yellow-feathered chick,
While he listened in the dark to the singing of a lark,
And the very noisy sound
Of the ducks all quacking round,
Grew so full of discontent
That at last away he went
To walk without his mother in the park.

It was really quite delightful to be there!
With the fairy clouds on high chasing sunbeams in the sky,
With the buttercups in rows
Standing taller than his nose,
And the little slugs and snails
In among them making trails,
Never dreaming that an enemy was nigh.

Very shortly half a dozen disappeared—
And a jolly breakfast that, for each one of them was fat!—
When a rather curious sound
Made him pause and look around,
And, with terrified surprise
In his bright and beady eyes,
This yellow-feathered chick saw the cat!

Now the story of his life endeth here:
He was eaten, I suppose, 'mid the buttercups in rows,
And the snails who saw the sight
Said it surely served him right.
He is dead and gone, alack!
Here is Pussy coming back
With a tell-tale yellow feather on her nose.—M. BAYNE.

II. THE LAMPLIGHTER.

WHEN the winter day is over,
With its chilling rain and sleet,
And the dreary light has faded
In the sky above the street,
Then along the pavement ringing
Comes a brisk and steady tramp,
And we say to one another,
"That's the man that lights the lamp!"

What a merry tune he whistles
As he hurries here and there!
Groups of little barefoot children
Waiting for him everywhere,
Trotting on behind his ladder,
Stopping ever as *he* stops,
While the moon in silver beauty
Sails among the high tree tops.

Faint and distant seems the shining
Of this lantern in the sky;
And the children hardly see it
Hanging there so fair and high.
Better far they love the twinkle
Of a single city lamp,
And the glare of lighted windows
Down among the fogs and damp.

Now the cheery man has vanished!
Dies the echo of his feet,
But his work remains behind him—
Chains of light along the street;
Merry lamps that chase the terrors
Of the darksome night away,
Keeping guard along the pathways
Till the dawning of the day.—M. BAYNE.

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(From Nelson's "Infant School Song-Book," No. 1.)

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Till the dawning of the day.—M. BAYNE.

OUR TUTORIAL SECTION

OUR PUPIL TEACHERS' AND SCHOLARSHIP COURSE.

BY ARTHUR T. FLUX,

Principal of the Belvedere Pupil Teachers' Centre, First on Scholarship List; Author of "Scholarship School Management," "Building of the British Empire," etc.

SCHOLARSHIP EXAMINATION, 1902.
Second Month—February.

Work for the Month.

1. *Reading.*—*Quentin Durward*, chaps. v.–ix. (For notes, see page 421.)

2. *Repetition.*—Ten or twelve lines per week.

3. *Teaching.*—Chap. ii., *Scholarship School Management.*

If chap. i. was not thoroughly mastered last month, it should be finished this month. The principles there laid down underlie all successful teaching, and must be clearly understood. Students are warned against thinking that because there will be no paper in this subject, therefore there is no need of preparation. The practical work done in school needs to be supplemented by careful reading and thought.

4. *Drawing.*—A freehand copy per week. This should be sent up for criticism, if there is no means of getting it properly marked at home.

5. *Music.*—Chap. ii., *School Music Teacher.* Code requirements for the various standards, and how taught. Mental effects, and how modified.

6. *Needlework.*

7. *Penmanship.*—The small letters. Learn definite rules for size, lengths of loops, etc.

8. *Spelling.*—One hundred words per week, from *Words Commonly Misspelt.*

9. *Composition.*—Write one or two essays each week on such subjects as—"A Backward Spring," "Free Education," "Sympathy," "The heights by great men reached and kept—Were not attained by sudden flight," "Punctuality," "Evil is wrought by want of thought—As well as want of heart."

Read up any subject with which you are unacquainted; arrange your ideas in a definite plan before commencing to write, then express them in the best language at your command. Many students will find it of great use to go very carefully through the list of common mistakes given in *The Pupil Teacher's English Notebook.* The greatest fault in essays sent up for criticism is not a paucity of facts or ideas, but an awkwardness and confusion in expressing them. There is too frequently a striving after effect by the use of words and phrases which are not thoroughly understood; a long word is used where a short one would do much better.

10. *English.*—

(1.) Twenty-five roots and meanings per week.

(2.) The grammar of the adjective.

(3.) The changes produced in the language by the Conquest.

(4.) *Julius Cæsar.*—Finish Act I.

In preparing the grammar and syntax of the adjective, the following points must receive attention:—

(1.) Learn an exact definition and classification.

(2.) Note the adjectives which are compared irregularly, and account for the difference in the forms—for example, *good, better, best. Better* and *best* evidently do not come from the root *good.* They are the comparative and superlative degrees of a root, *bat*, which is obsolete. So *worse* and *worst* are derived from the A.S. *wear* = bad. *Later* and *latest* refer to time, *latter* and *last* to position in a series. *Further* and *furthest* come from *forth*, and refer to degree; *farther* and *farthest* from *far*, and refer to actual distance. The *th* in the two latter is intrusive. The Anglo-Saxon forms were *fyrra* and *feorrest*, and Chaucer uses *ferre* and *ferrest.* The intruded letters were due to a confusion with *further* and *furthest.* The superlatives ending in *-most*—for example, *foremost*—are not compounds of the adverb *most*, but the result of using a double ending, *-ema* and *-ost.*

Some adjectives do not admit of comparison. This is easily understood from the definition—An adjective is a word implying some quality or number, or pointing out and distinguishing a noun. It is evident the adjective of distinction and of definite number cannot be compared. We can have no degree of *this* or *twenty.* With adjectives of quality, those only may be compared where the quality they express can exist in varying degrees. We can imagine different degrees of *wise* or *good*, but not of *square* or *perfect.* The following is a list of adjectives which do not admit of comparison:—

(*a*) Adjectives of nationality—English, French, German, etc.

(*b*) Adjectives of material—wooden, golden, silver, etc.

(*c*) Adjectives of definite geometrical shape—square, triangular, circular.

(*d*) Adjectives of time—monthly, weekly, annual.

(*e*) Adjectives expressing a quality which exists in one degree only—for example, right, wrong, perfect, etc.

(Although such phrases as *more perfect, extremest*, are met with, they are incorrect.)

Note also the difference between *each* and *either*, *each* and *every*, *each* and *all*, etc.

Literature.—The changes produced in the Anglo-Saxon language by the introduction of Norman-French are many and very important. The former was a highly inflected language, and new words were formed by compounding from other words. The Norman who endeavoured to understand Anglo-Saxon was content to remember the *stem* of the word without troubling much about the endings. Hence after the strife of tongues, which lasted two hundred and fifty years, the Anglo-Saxon words had lost many of their inflections, and also to a large extent the power of forming compounds. It is not difficult, in the majority of cases, to determine whether a word is English or of foreign origin.

(1.) Nearly all monosyllables are English; only about two hundred and fifty are not.

(2.) Nearly all the numerals, conjunctions, prepositions, pronouns, and demonstratives are of Anglo-Saxon origin.

(3.) Words that are irregular in inflection are Anglo-Saxon.

(4.) Certain combinations of letters—for example, *wh* (what, which), *kn* (knight, knife), *gn* (gnaw), *ough* (rough, enough)—are found only in English words.

(5.) Words with Anglo-Saxon prefixes and affixes are Anglo-Saxon, but there are many hybrids—that is, words of foreign origin with English prefixes or suffixes, and *vice versâ*; for example, *ungovernable.*

(6.) Words which name simple ideas, natural objects, common articles of use, parts of the body, simple feelings and emotions, are Anglo-Saxon.

The Anglo-Saxon had terms for the individuals of a class, but not for the whole class—for example, *dig, sow, plough*, but not *agriculture; father, mother, sister*, but not *relation; love, joy, hope*, but not *emotion.*

These changes are dealt with fully in *The Pupil Teacher's English Notebook.*

Julius Cæsar.—The following are points on which explanation has been asked. I shall be glad at any time to assist students in difficulty, but it is impossible to annotate the play fully in these columns, nor indeed is it necessary.

(1.) *Get you home.* Case of *home.* This is the adverbial object. Compare, "he walked a mile," "it weighs a pound."

(2.) *As* proper men *as* ever trod, etc. The first *as* is an adverb of degree; the second is a relative pronoun.

(3.) That *needs* must light. *Needs* is not a verb in this case, but a noun in the genitive case = of need, or of necessity.

(4.) *As I was wont to have.* *As* = relative pronoun, governed by *to have.* *Wont*, adjective, qualifying *I*; properly a perfect participle, from *wunian*, to be accustomed. *To have*, infinitive, limiting *was wont.*

(5.) *It* is very much lamented that, etc. In all cases like this *it* is an impersonal pronoun, and the sentence commencing "that" is a noun sentence in apposition to *it.*

(6.) Hold me *dangerous.* Adjective of quality, qualifying *me*, used proleptically after *hold.*

(7.) *I had as lief not be as live to be*, etc. = I would as willingly not exist at all as I would live, etc. *Had* is subjunctive; *lief* an old adjective; *be* an infinitive, forming the object of *had.*

(8.) Brutus *had* rather be a villager. As above, *had* is subjunctive = would; *be* the completion.

11. *Geography.*—

(*a*) Revise Europe generally.

(*b*) The geography of India.

(Students are advised to study the excellent articles on geography by Dr. Herbertson in these columns.)

In revising the general geography of Europe, the notebooks kept during the past three years should be of great assistance. Mere lists of capes and bays no longer form the chief subjects of questions, and students must obtain some more exact knowledge of the land and its productions, imports, exports, peoples, etc., commercial and social geography, rather than mere lists of names.

As regards India, the following points must be mastered:—

(1.) An outline of its history; how we obtained a footing in India, and how our power has gradually been extended.

(2.) The climate, especially the monsoons.

(3.) The productions, particularly those which have of recent years been largely developed—for example, tea, cotton, jute, coffee, etc.

(4.) Imports, exports, and the countries with which the bulk of the trade is done.

(5.) The people—various races and divisions, and their characteristics.

(6) The great roads, canals, railways.

(7.) The government, which is unique. India is a dependency, not a colony; and is not under the control of the Colonial Office, but of the Secretary of State for India and a special department.

Briefly, there are two divisions of the Government:—

(*a*) In England: the Secretary of State for India, aided by a council of men who have lived in India for at least ten years, and who are not in the English Parliament.

(*b*) In India: (1) the Governor-General—Lord Curzon; (2) the Commander-in-Chief of the Forces; (3) five members.

(These seven form the Supreme Government.)

There are also some sixteen members for legislative purposes—men whose knowledge of the various districts is great, and who may be called to the council when needed. The whole of the country directly under English rule—that is, excluding the Native States—is divided into thirteen provinces (or fourteen including the new frontier province in the north-west), each under a Lieutenant-Governor, Governor, or Chief Commissioner. The provinces are, again, divided into districts, of which there are about two hundred and fifty, each under a Deputy Commissioner, Collector, or Magistrate.

The following recent questions indicate the line taken by examiners:—

(1.) What are the chief exports of India? What goods does it take from us?

(2.) Name in order, from source to delta, the chief towns in the basins of the Ganges and Jumna, and mention briefly matters of interest connected with any of them—historical, political, or commercial.

(3.) Say what you know of the causes, effects, and times of the monsoons in Northern and Southern India respectively.

(4.) What are the area and population of India? Mention some of the different races found in it. From what parts of India do the Sikhs, Ghoorkas, and Mahrattas come?

(5) Explain, by reference to the climate of the country, why it is desirable for Europeans to spend a portion of the year in one of the hill stations of India, and draw a sketch-map indicating the position of the latter.

(6.) Many rivers of India rise in the Western Ghauts and flow eastward. Show that this statement is correct, and give reasons for the fact.

(7.) Into what three portions does the peninsula of India physically divide itself? State very briefly some physical characteristics of each portion, and name in each portion three towns which are not seaports.

(8.) What manufactures and exports of India have lately developed most? What are the chief reasons for the development?

(9.) Explain as concisely as you can how India is governed.

(10.) How are the revenues of the Government obtained in India, and what great public works are carried out by the Government in that country?

(11.) What are the principal railways of India? Describe a journey by one of them.

(12.) Give some account of our first settlement in India, and of successive additions to our empire there.

12. *History.*—The Norman kings. The chief points to be looked after are:—

(1.) Changes produced by, and results of, the Conquest.

(2.) The Feudal System, and all the terms connected with it—for example, knights' fees, subinfeudation, feudal incidents, feudal ceremonies (homage, fealty, investiture), alienation, allodial lands, curfew, Domesday Book, manor, pre-emption, primer seisin, purveyance, scutage, soccage, tallage, vassal.

Note also the difference between Saxon and Norman feudalism. Under the former the land was the tenant's, and feudalism went *upwards* from the freeman to the hundred and shire moots and Witenagemote, which elected the king; in the latter the land was the lord's, and feudalism went *downwards* from the king.

(3.) The substitution of the Magnum Concilium for the Witenagemote; and as the former consisted of all tenants *in capite*, and was therefore unwieldy, the growth of the *Curia Regis*, or king's court, consisting of the justiciar, chancellor, and treasurer, and the chief officers of the household—all power gradually drifting into the hands of the first three.

(4.) The church. The Saxon clergy were ignorant and lazy, and the influence of the Norman Church was beneficial and widespreading: (*a*) it fostered learning; (*b*) it protected the populace from the barons, and acted charitably towards the poor; (*c*) it developed horticulture and agriculture; (*d*) it introduced and developed a splendid architecture, nearly all our cathedrals and great churches dating from this period; (*e*) it increased the number of monasteries and schools.

(5.) The Investiture dispute. The kings of England steadily resisted the attempts of the church to encroach upon the political supremacy of the sovereign. The question at issue in the Investiture dispute was not the empty honour of investing a bishop, but the determining whether the great prelates were to be vassals of the king or of the pope.

(6.) The Crusades, and their influence on Western Europe.

(7.) The civil war in the time of Stephen, and its attendant evils.

13. *Arithmetic.*—Vulgar and decimal fractions. Pay particular attention to the theory of decimals, and be prepared to answer such questions as—What is a decimal? In what sense may 5

be said to be equal to 1? Prove the rule for the conversion of mixed circulating decimals into vulgar fractions. State the laws which determine whether a vulgar fraction may be expressed as a finite or recurring decimal, and if the latter, the limit of the number of digits in the quotient before it recurs.

Take care, in multiplication of decimals, to use the method by which each line appears as the proper multiple of the number—that is, do not follow the ordinary rule of multiplying as in simple multiplication, and then determine the position of the point by adding the number of decimal places in the multiplicand and multiplier. For instance, 31·25 × 1·25. The ordinary method is—

$$\begin{array}{r} 31{\cdot}25 \\ 1{\cdot}25 \\ \hline 15625 \\ 6250 \\ 3125 \\ \hline 39{\cdot}0625 \end{array}$$

But this does not show the exact value of each line. The sum should be arranged thus:—

$$\begin{array}{rcl} 31{\cdot}25 & & \\ 1{\cdot}25 & & \\ 31{\cdot}25 & = & 31{\cdot}25 \times 1 \\ 6{\cdot}250 & = & 31{\cdot}25 \times {\cdot}2 \\ 1{\cdot}5625 & = & 31{\cdot}25 \times {\cdot}05 \\ \hline 39{\cdot}0625 & = & 3125 \times 1{\cdot}25 \end{array}$$

14. *Algebra.*—Fractions; addition and subtraction. Study carefully the examples in Hall and Knight.

15. *Euclid.*—Book II., Props. 5-8, with four deductions per week.

16. *Languages.*—Chaps. iv.-vi., *Life of Miltiades* (PRACTICAL TEACHER edition). Read as much French as possible.

17. *Elementary Science.—The Mechanical Powers:* Principle of the lever, pulley, inclined plane, and screw. *Energy:* Heat, radiation, electricity, and chemical action as forms of energy. Mechanical work.

18. *General Information.*—As it is impossible to cover this subject in a series of notes, I propose each month to answer in these columns queries which have been sent to me, and to supplement this by setting a few questions. The answers to the latter I shall be pleased to mark gratis, and at the end of the course to give a prize of a guinea to the student who has obtained most marks during the year. Answers sent in for this purpose should be marked "Competition," and a stamped addressed envelope must be sent if the papers are to be returned.

ANSWERS.—1. *What is meant by the Music of the Spheres?*—By the Ptolemaic system of astronomy the Earth was the centre of the universe, and was surrounded by spheres—(1) the Moon; (2) Venus; (3) Mercury; (4) the Sun; (5) Mars; (6) Jupiter; (7) Saturn; (8) Fixed Stars; (9) the Crystalline or Primum Mobile. These revolved round the Earth, and in their motion gave rise to delicious music. Milton refers to this in his Ode on the Nativity,—

> "Ring out, ye crystal spheres!
> Once bless our human ears
> (If ye have power to touch our senses so);
> And let your silver chime
> Move in melodious time;
> And let the base of heaven's deep organ blow:
> And with your ninefold harmony
> Make up full consort to the angelic symphony."

2. *Who were the Seven Sleepers?*—Seven young men of Ephesus, who fled from the Decian persecution to a cave in Mount Celion, where they slept for two hundred and thirty years. The tale is, of course, a myth.

3. *What is meant by the letters A.U.C.?*—These are the initials of *Anno Urbis Conditæ* = the year from the founding of the city. The Romans dated their years from the founding of Rome.

4. *What is wireless telegraphy?*—Space does not permit a detailed account of this. Briefly, it consists of setting up electrical waves in the atmosphere by means of one piece of apparatus, and the reception of these waves by a specially constructed receiver. Signor Marconi, who has developed this, claims to have signalled from Europe to Newfoundland, but the invention is not yet sufficiently under control to be of practical utility.

Questions for Competition.

1. What is cochineal, copra, assafœtida, isinglass, shagreen?
2. Where do the following lines occur?—
   (*a*) "The paths of glory lead but to the grave."
   (*b*) "The old order changeth, yielding place to new."
   (*c*) "Roll on, thou deep and dark blue ocean, roll!"
   (*d*) "To be or not to be, that is the question."
   (*e*) "The breaking waves dashed high on a stern and rock-bound coast."
   (*f*) "Quoth the Raven—Nevermore."
3. What do the following phrases mean?—*Lapsus linguæ, bonâ fides, verb. sap., ça va sans dire, cum grano salis, id genus omne, sine qud non.*
4. What are the following abbreviations of?—C.I.E., D.D., F.R.H.S., D.S.O., V.C., M.I.C.E., R.S.V.P., etc.
5. What is meant by "Entered at Stationers' Hall," "All rights reserved," "letters patent," "foolscap"?
6. What is vaccination, and what is its use?
7. What is the Cabinet? Who form the Cabinet at the present time?
8. Which is heavier—a pound of gold or a pound of feathers? Give reasons for your answer.
9. In what part of the sky do you never see a rainbow? Why?
10. Why do birds migrate from one country to another?

Questions on the Work for the Month.

(The answers to these are marked and returned for a nominal fee of one shilling.)

1. Write a specimen of copy-setting:—
   (*a*) Large Hand—*Productibility.*
   (*b*) Small Hand—*There is a willow grows aslant the brook.*
2. How may memory be trained? What should be learnt by heart?
3. Write an essay on Pictures.
4. Explain, with examples—adverbial object, factitive object, cognate object, ethical dative, residual object.
5. Give in your own words the arguments advanced by Cassius in endeavouring to secure the co-operation of Brutus.
6. Mention half a dozen places in the British Isles which have grown rapidly of recent years, and give reason in each case.
7. Write notes of a lesson on Malta.
8. Explain the Feudal System as it existed in Saxon times.
9. What were the chief aims of Dunstan? How far did he succeed in carrying them out?
10. Point out how the Norman Conquest was aided by preceding events.
11. (*a*) One pendulum oscillates in $\frac{5}{6}$ of a second, and another in $\frac{7}{8}$ of a second. If started simultaneously, how often will they tick together in an hour? Ans. $457\frac{1}{2}$.

    (*b*) How do you know at first sight whether a number is or is not divisible by 3, 4, 5, 6, 8, 9, 10, respectively. Give examples.
12. Resolve into factors—
    (1.) $2xyz + x^2(y+z) + y^2(z+x) + z^2(x+y)$.
    Ans. $(x+y)(y+z)(z+x)$.
    (2.) $(1+a)^2(1+c^2) - (1+c)^2(1+a^2)$.
    Ans. $2(a-c)(1-ac)$.
    (3.) $x^4 - (a+b)x^3 + (a+b)abx - a^2b^2$.
    Ans. $(x-a)(x-b)(x^2-ab)$.
    (4.) $(a^2+b^2-c^2)^2 - 4a^2b^2$.
    Ans. $(a+b+c)(a+b-c)(a-b+c)(a-b-c)$.
    (5.) $m^4 - n^4 + 2n(m^2+n^2) - (m+n)^2(m-n)^2$.
    Ans. $2m^2n(m+n)$.
    (6.) $(x+a)^4 - (x-a)^4$. Ans. $8ax(a^2+x^2)$.
13. Explain, with examples, the parallelogram of forces. A kite is motionless in the air. Draw a diagram showing the forces acting upon it.

SPRING EXAMINATION, 1902.
Eleventh Month—February.

WORK TO BE PREPARED.

1. ENGLISH.

Candidates.—Finish the *Ode on the Spring.*

First Year.—The *Expostulation*, lines 310-339, or *The Task*, Book V., lines 330-362, with meanings and derivations of all important words.

Second Year.—*Paradise Lost*, Book III., lines 630-680.

2. COMPOSITION.

Write one or two essays each week from the list given in *The Pupil Teacher's English Notebook.* Send up one occasionally for criticism.

3. HISTORY.

Candidates.—William IV. and Victoria.

First Year.—Elizabeth.

Second Year.—Victoria.

4. Geography.

Candidates.—The general geography of America.
First Year.—India.
Second Year.—Revise Africa.

5. Arithmetic.

All Years.—General problems on the year's work.

6. Euclid and Algebra.

First Year.—Euclid: Revise Props. 13 and 14, with six deductions per week. Algebra: general exercises.
Second Year.—Euclid: Props. 40–48, with six deductions per week. Algebra: problems on equation and theory.

Notes on the Work for the Month.

1. English.

Candidates.—Gray's "Ode on the Spring."

General Paraphrase (continued).

Verse 5. In answer to my musings, I seem to hear the voice of the insects replying to me: "And if we are doomed to a short life, you are in no better case; in fact, you are worse off than we are: for you are solitary; we are not. You have no female companion to welcome you and adorn herself for your pleasure; nothing stored up for the future. Your youth has fled quickly without your deriving any pleasure from it, and now old age is fast creeping on; we, wiser than you have been, are enjoying our youth and health while we have the chance."

Notes on Parsing and Analysis.

Verse 5. *Methinks.* This is a word sentence. *It* understood is the subject, *thinks* the predicate, *me* the indirect object, the following noun sentence the object.
Kind. Collective noun, object of *hear.*
Reply = to reply. Verb in the infinitive mood, governed by *hear.*
Moralist. Nominative of address.
Fly. Nominative after *thou art* understood.
Joys. Object, governed by *meets.*
To display. Verb in the infinitive mood, qualifying *plumage.*

First Year.—Cowper's "Task," Book V.

General Paraphrase (continued).

Line 331. What I have said must not be taken to mean that I am opposed to the institution of monarchy. I can love and admire a king who is content to rule within the limits which the laws of the country have assigned to him, and makes no attempt to encroach upon the privileges of the subject. I gladly serve and obey a king who does not interfere with my proper liberty; but, bearing in mind that he is only a man, and subject to the same temptations as other men, I do not place myself blindly in his absolute power. He may be a king, even King of England, but he may be weak enough to give way to improper ambition, or to use the power granted to him wrongly, and thus endeavour to increase his prerogative at the expense of his subjects. If he attempts this, he is a traitor to his country. His duty clearly is to see that the laws are properly obeyed, to safeguard the interests of his realm, and to stand for the dignity and power of the nation. Our duty, on the other hand, is to serve him loyally, to death if need be, in furthering the common good of all; but we are not slaves to be driven.

Line 346. Now what is the difference between the loyalty of English people and that of other nations where the king is an absolute monarch? We love the man; they the outward pomp and show of his court and surroundings. We look upon the king as the chief citizen of the country, whose especial duty it is to protect it; they are compelled to regard him as the chief cause of all its troubles. Our ruler is the head of a free people; theirs the tyrant who regards them all as slaves. Our loyalty is a feeling based upon reason, a submission free from subservience, a homage without any suspicion of slavery, a free good will which originates in ourselves; their loyalty is the crouching cowardice and fear of a whipped cur—a degraded sentiment which any free man would abhor.

Line 357. If the office of a king were as pleasant and enjoyable as it appears to be, I would not be a king to be loved without cause and to be flattered with empty praise. I should rather wish to be respected by all, not from the mere accident of my being a king, but because I filled the position properly and with a sincere endeavour to promote the good of my subjects.

Notes on Parsing and Analysis.

Line 334. *Free.* Adjective, qualifying *us*, used proleptically after *leaves.*
335. *That he is man.* Noun sentence, governed by *recollecting.*
336. *Though.* Conjunction—hypothetical.
Be. Subjunctive mood.
338. *Enough.* Adverb of degree, modifying *weak* and *vain.*
To be. Infinitive, limiting *enough.*
342. *To administer.* This and the following infinitives are employed to modify the predicate *is ours.*
345. *True.* Adjective, qualifying *we* (343).
349. Supply *love* in this and succeeding lines.
355. *Instinct.* In apposition with *yours.*
357. *Were.* Subjunctive mood.
Arrange the sentences—
1. If kingship were as true treasure.
2. As it seems to be true treasure.
359. *To be beloved.* Passive infinitive, qualifying *king.*
360. *Causeless = causelessly.* Adverb, modifying *to be beloved.*
Daubed = to be daubed.

Full notes on the *Expostulation* and Milton's *Paradise Lost*, Book III., are given in the edition by Messrs. T. Nelson and Sons.

2. History.

Candidates.—The chief interest of William the Fourth's reign centres in the Reform Bill. This must be carefully prepared. Why was reform needed?

(*a*) In the eighteenth century only two per cent. of the people were electors.
(*b*) Seats were openly bought and sold.
(*c*) The increase in manufactures had led large numbers of people to leave the country and flock into the towns. These new towns—Manchester, Birmingham, Leeds, etc.—had no members.
(*d*) The House of Commons did not represent the commons of England.

What the Bill did:—
(*a*) It took away from 143 places the right to elect members, and gave the right to towns and counties.
(*b*) It extended the franchise to the middle classes. The right to vote was given to the labouring classes by the Reform Bills of 1867 and 1885.

Following reform of the Parliament came municipal reform, 1835. Previous to this the government of the towns had been in the hands of a few citizens only; by the Act, the right to elect the town councils was given to ratepayers.

The new Poor Law of 1834 is also important. Up till this time outdoor relief had been granted so lavishly that it paid a man to do no work; hence a large proportion of the labourers were living at the expense of those who worked hard. By this Act a man was compelled to enter a workhouse if he wanted relief. The result of the passing of the Act was that the amount spent upon the poor decreased at once one-half.

In Queen Victoria's reign, the Repeal of the Corn Laws, the Indian Mutiny, the Crimean War, and the great advances in science, art, communications, social welfare of the people, etc., must be read up.

First Year.—The reign of Elizabeth is most important. The meaning of the events is best grasped by endeavouring to understand the difficulties which confronted the young queen on her accession, and then tracing the methods and means by which they were overcome. In 1558 England was in a sad state—no army, no navy, no trade or manufacture, a debased coinage, the kingdom divided into two hostile religious parties, the enmity of France, Spain, Scotland, and the Pope. It was entirely at the mercy of either France or Spain, and it was only through the schemes of Elizabeth and her advisers that an invasion was delayed till the country was strong enough to meet it.

A navy was created by the encouragement given by the queen to merchant adventurers. The coinage was recast. Trade developed. Flemish refugees were settled in Sandwich and Norwich, and founded the weaving industry in England. The religious difficulty was overcome by treating all men as *Englishmen*, and by tacitly tolerating Roman Catholicism so long as it was not connected with political plots.

Spain was kept busy by the support given by the queen to the revolted Netherlands, and France by the help given to the Huguenots.

The life of Mary Queen of Scots, the Armada, the Irish Rebellion, the Poor Laws, must be also prepared.

3. Geography.

First Year.—See notes, etc., on India under Scholarship Course.
Second Year.—The following questions have been asked on Africa:—

1. What do you know of the climate and productions of British South Africa?
2. State as accurately as you can the boundaries of Cape Colony, and compare it with Great Britain with regard to (1) size, (2) climate, (3) population.
3. How is Cape Colony governed? Is it well suited for agriculture? What minerals are found in the country?
4. Compare the physical features of Africa with those of Australia.
5. What do you know of the productions, climate, government, and people of Madagascar?
6. Write what you know of the north coast of Africa and its principal harbours.
7. Account as fully as you can for the fertility and present importance of Egypt, and describe the position of Cairo, Port Said, Alexandria, Khartoum.
8. Say what you can of Equatorial Africa.
9. Describe the course of the Congo, and say what you can of the Congo Free State.
10. What and where are Kimberley, Zanzibar, Suakim, and Stanley Falls?
11. Give some account of the races, climate, and productions of British East Africa.
12. Describe the course of the Cape to Cairo Railway, and point out the probable results of its construction.
13. A line of steamers runs regularly from Liverpool to the west coast of Africa. Mention the chief ports of call, and the principal articles which form the cargo on the outward and homeward voyages respectively.

Questions on the Month's Work.

Candidates.

1. Analyse the following, and parse words in italics:—

"To *Contemplation's* sober eye,
Such is the race of man;
And they *that* creep, and they that fly,
Shall end *where* they began."

2. Give the meaning of the suffixes in the following words:—*Thraldom, hatred, landscape, flight, pipkin, bullock, laggard, buxom.*

3. Under what circumstances were the American colonies lost to us?

4. Write a life of Wellington, Nelson, or Napoleon.

5. Describe, with a sketch-map, the mountain system of Asia.

6. Say what you know of the physical features of Australia.

7. (*a*) Simplify $\frac{\frac{1}{2}-\frac{1}{3}}{\frac{1}{2}+\frac{1}{3}}$ of $\frac{\frac{1}{4}-\frac{1}{5}}{\frac{1}{4}+\frac{1}{5}}$ of $\frac{\frac{1}{6}-\frac{1}{7}}{\frac{1}{6}+\frac{1}{7}}$ of 585. Ans. $\frac{1}{15}$.

(*b*) Find the sum of 2·4, ·32, ·567, 7·056, 4·17, ·4304125. Ans. 15.

(*c*) Find by practice the value of a nugget of gold weighing 3 lbs. 11 oz. 8 dwt. 4 grs., at £3, 17s. 6d. per oz.
Ans. £183, 14s. 1¾d.

(*d*) Explain your method of placing the decimal point in the quotient when one decimal fraction is divided by another.

8. Write an essay on "The Difference between Poetry and Prose."

9. (*a*) Rearrange the following in order of pitch:—

d m' l s r f' t, s, m d'.

(*b*) Name the intervals which each of the following notes makes with the others:—

d f l t.

(*c*) Write the following in two-pulse measure:—

1½ ½ ¾ ¼ 1 1½ ½ 2 ½ ½ ¼ ¼ ¼
d m l s s r rest s m d f r d.

First Year.

1. Analyse the following, and parse words in italics:—

"But is *it fit*, or *can* it bear the shock
Of rational discussion, *that* a man,
Compounded and made up *like other men*,
Should be a despot absolute, and boast
Himself the only *free man* in the land?"

Or—

"Thy rulers load thy credit, *year* by year,
With sums Peruvian mines *could* never clear;
As if, like arches built with skilful hand,
The more 'twere pressed the firmer it would stand."

2. Give the meaning and use of the prefixes in the following words:—*Akin, befriend, gainsay, preterite, ultramontane, diameter, anarchy, perimeter, prosody.*

3. Define, with examples, the various kinds of sentence you recognise in analysis.

4. Give some account of the condition of the poor in the reign of Edward the Sixth. What attempts were made to alleviate distress?

5. Say what you know of the Marian persecution.

6. Point out the points of similarity between Japan and England.

7. What are treaty ports? Name five of the chief, and indicate the character of the trade carried on through them.

8. (*a*) A sum of £251, 15s. 11d. is transmitted through Paris to New York. £1 is worth 24 fr. 64 centimes at Paris, and 6 francs 23 centimes are worth 2 dollars 25 cents American. Find the value of the sum in dollars.
Ans. 2240 dolls. 70 cents.

(*b*) If 28 men mow 672 acres in 24 days of 8½ hours each, how many hours a day would 120 men take to mow 1080 acres in 9 days? Ans. 8½ hours.

(*c*) A and B undertake to do each ½ of a piece of work. A begins at 9, B at 10.30. Both stop at 12, having done ¼ of the work. They resume at 1. A finishes his share at 4; when will B finish? Ans. 8.30 p.m.

(*d*) A money-lender charges £2, 10s. for the loan of £13, 10s. for 3 months; what rate of interest per annum does he charge? Ans. 74.3% per cent.

9. Write an essay on "Spring Flowers."

10. (*a*) Rewrite the following, making a change to the first sharp key at (*a*) and a return to the original at (*b*):—

(*a*) (*b*)
d m s l fe t d' s m d r s m d.

(*b*) Write the following in two-pulse measure:—

1 2/3 1/3 1/3 1/3 1/3 1/3 2/3 1 1/3 2/3
d m r s f m r d f d.

(*c*) Construct a modulator showing the proper position of the notes in the keys C, F, and G.

Second Year.

1. Paraphrase the following:—

"Far and wide his eye commands;
For sight no obstacle found here, nor shade,
But all sunshine, *as* when his beams at noon
Culminate from the equator, as they now
Shot upward *still direct*, whence no *way* round
Shadow from body opaque can fall; and the air,
Nowhere so clear, sharpened his visual ray
To objects distant far, *whereby* he soon
Saw within ken a glorious angel *stand*,
The same whom John saw also in the sun."

2. Analyse the above, and parse words in italics.

3. Explain the events which led to the battle of Navarino, and describe it.

4. Point out the necessity for the Reform Bill. What do you know of the Poor Law Reform Act?

5. Describe the industries of New Zealand, and say what you can of the imports and exports.

6. Describe a journey from London to Wellington. Mention the cost, and the probable time occupied by the passage.

7. (*a*) A man who receives £503 interest from a certain amount of 3 per cent. stock sells out, and so realises £15,000, 3s. 4d. At what price is stock selling?
Ans. 89½.

(*b*) A can do a certain piece of work alone in 8 days, and B the same in 5. After working 2¾ days they are joined by C, and just finish it by the end of the day. How long would C take to do it alone?
Ans. 10 days.

(*c*) A clock which gains 2½ minutes in 24 hours is 3 minutes slow at noon on Saturday. When will it indicate correct time, and what will it indicate at 6 o'clock on Monday evening? Ans. 8 p.m. on Monday; 5 hrs. 59 min. 48¾ sec.

(*d*) If 4 men and 14 women can do in 5 days a piece of work which 5 men and 7 children can do in 8 days, or 5 women and 4 children can do in 14 days, find (1) how many men, (2) women, (3) children could do the work in 1 day. Ans. 60; 105; 168.

8. Write an essay on "The War in South Africa."

9. *Boys.*

(*a*) Simplify the expression—

$$2[x - 3\{x - 4(x - \tfrac{1}{8}x - a)\}];$$

and also add—

$$\overline{(a - b}x - \overline{b - c}y) - (\overline{a + b}x + \overline{b + c}y) \text{ to } ax + cy + b(x + y).$$

Ans. $2 + a$; $(a - b)x - (b - c)y$.

(*b*) If $a = 2$, find the value of—

$$a^{2a-1} + 2a^{a-1} + (2a - 1)^a.$$ Ans. 21.

(*c*) The product of two algebraical expressions is—

$$4a^2b^2 + 2(3a^4 - 2b^4) - ab(5a^2 - 11b^2),$$

and one of them is $3a^2 + 2ab - b^2$; find the other.
Ans. $2a^2 - 3ab + 4b^2$.

(*d*) Show that $\dfrac{x^6 - y^6}{x^2 - y^2} = (x + y)(x^2 - xy + y^2)$.

(*e*) Solve—

(i.) $\dfrac{2}{3}(x - 8) + \dfrac{3}{4}(x - 9) - \dfrac{5}{6}(x - 11) = 7 - \dfrac{3}{8}(x - 17)$.
Ans. 17.

(ii.) $\dfrac{3x - 7}{4x + 2} = \dfrac{3x - 14}{4x - 13}$. Ans. 7.

10. How would you set about teaching a new song to a class?

CORRESPONDENCE: RULES (as usual).

ANSWERS TO CORRESPONDENTS.

W. Le M.—I do not know the book to which you refer, but I will put a note on the subject in next number.

The New Simplifications in French Grammar.

THE simplifications in French grammar authorised by the Minister of Public Instruction in his Decree of February 26, 1901, have now been recognised by a considerable number of the leading examining bodies in this country, including H.M. Civil Service Commissioners, the Oxford and Cambridge Local Delegates, and the College of Preceptors.

One of the objects aimed at by the promoters of these changes has been to lessen for foreigners the labour of learning the French language. The mere circulation among candidates for examination of a translation of the Decree, after they have already been put to the trouble of learning rules which are no longer binding, is necessarily of little value. In view of this, Prof. E. Weekley, of University College, Nottingham, has prepared a manual in which all the simplifications are incorporated in the text. This book, which is entitled *The Matriculation French Course*, contains accidence, syntax, exercises, and continuous passages for translation into French, and is intended for use by candidates preparing for the London University Matriculation and other examinations of similar standard. It is issued by the University Tutorial Press, price 3s. 6d.

NOTES ON "QUENTIN DURWARD."

(*Continued.*)

(*N.B.—The pages refer to the New Century edition of the novel published by Messrs. T. Nelson and Sons, 35 Paternoster Row, London, E.C. 2s.*)

CHAPTER V.

Page 55. *Cadets.* Younger sons.

58. *Gorget.* The piece of armour encircling the throat.
Mercy of God. This dagger was used to dispatch a fallen adversary—to give the *coup de grâce*, as it was called.
Baldric. A broad belt which hung over the shoulder.

57. *Gâin-puettes.* Refreshment gardens.

58. *The joyous science.* A term applied to minstrelsy; ballad-singing.
Tasker. One who sets tasks; a foreman.

59. *Purgatory.* The place to which, according to the belief of the Roman Catholics, departed spirits go, to pass a period of punishment and probation which varies in length according to their behaviour while alive. The saying of masses or special intercession prayers for them shortened this period. Balafré here suggests that as his kinsmen lived good lives, their stay in purgatory—or "limbo," as he calls it—would probably be short, and hence the gold sent, though small in quantity, might purchase enough masses to free them entirely.
St. Bartholomew, according to tradition, was flayed alive.

61. *Novice.* A person who is serving a period of probation in a monastery before taking the vows as a monk.

62. *Carcanet.* A string of stones, or chain studded with stones, used as a necklace.

63. *Deas*—that is, *dais*, a raised platform.
Romaunts. Romances; tales.
Barbour. The Scotch author of a long poem entitled "The Bruce."
The Minstrel, or Blind Harry, who wrote a poetical history of Wallace.
Mêlée. A general fight.

65. *Du Guesclin* (1320-1380), the most celebrated French soldier of the century; commanded against the Black Prince; defeated and taken prisoner by Sir John Chandos; led an expedition into Spain and dethroned Pedro the Cruel in 1380.

66. *Feudatories.* Vassals.
King of Castile. This incident does not appear in history, but it is reported of Philip the Third that he died from being scorched with a brazier, which no one dared remove, because the officer whose duty it was to do so was absent.

67. *Snap-haunches.* Old-fashioned muskets. In this case it would mean that these guns were set so that a person stepping on or against a wire would cause the gun to explode at himself.

CHAPTER VI.

71. *Mechanical stranger.* A stranger who was a "mechanic," or man who worked for his living, not a gentleman. Compare *Julius Cæsar*, Act I., Scene 1,—

> "Know you not,
> Being mechanical, you ought not walk
> Upon a labouring day without the sign
> Of your profession?"

73. *Guerdon.* Reward.
Mountebank. In former times goods were displayed on a *banc* or bench, and the owners often *mounted* this *banc* to talk to the people. As this patter was generally supposed to be amusing, the term was applied to any one who sang or danced before an audience.
Liard. A small French coin.

74. *Broad arrow.* All government stores, convicts' clothes, etc., are marked with a broad arrow.
Ounce. Panther.

75. *Eblis.* The ruler of the genii or fallen angels in Mohammedan religion.

78. *Crupper and pommel.* The crupper is the strap passing from the saddle to the tail of a horse; the pommel is the raised fore part of the saddle.
Métairie. Farmhouse.

80. *Democritus and Heraclitus.* The former a Greek philosopher, known as "the laughing philosopher;" the latter taught at Ephesus, and mourned over the follies of mankind.
Jean-qui-pleure = crying Jack.
Jean-qui-rit = laughing Jack.

81. *In commendam.* Lat. in trust; along with.

82. *Beati qui in Domino moriuntur.* Blessed are they who die in the Lord.
Rebec. A three-stringed instrument, of Turkish or Arabian origin, played with a bow.

87. *Tie tippet about my craig.* Tie a rope round my neck.

CHAPTER VII.

90. *Misbelieving Jewish Moorish pagan.* This is a mixture of epithets which could hardly be applied to one man. The archer means, "everything not Christian."
Toque. A close-fitting hat with little or no brim.

91. *Pale.* Boundary; under the laws of.
Gentle Highland kin. Gentle here does not refer to manners, but to birth. The Highlanders were generally the reverse of *gentle*.
Spreagh. A cattle-raiding expedition. Many of the border chiefs regarded it as a disgrace to steal a single animal, but none to carry off a herd.

92. *Runlet.* A barrel of about eighteen gallons.
Harquebus. An old hand-gun, longer than a musket, supported on a rest by a hook of iron fastened to the barrel.

94. *Pirns.* Tangles.
Kindlike. Acting the part of a kinsman.
Skaith. Harm; injury. Compare *scatheless.*

Page 95. *Bairn.* Child; youth.
Brouet. Brewing, or what has been brewed.

96. *Stoup.* A deep, narrow vessel for holding liquids; a flagon holding about a pint.
Pricked off. Before the days of cheap paper and pencils, names were marked by pricking a hole opposite to them. The king marks the sheriffs of the counties in the same way to-day.
Extempore. Lat. *ex tempore* = out of the time; on the spur of the moment.
Gear in their aught. Property in their possession.

98. *Scraper of chins* = Oliver Dain, the trusted barber and factotum of the king.
Stretcher of throats = Tristan the executioner.

99. *Kissed the wincecup*—that is, took a drink.

100. *Chase with the hounds and run with the hare.* Support both side of a question to suit his own convenience.

101. *Litters.* Roads being usually too bad to allow of carriages being drawn over them, ladies travelled either on horseback, or, if the distance were short, in a kind of sedan-chair or litter.
Coutelier. Modern, cutler; armourer. (See p 55)
Jackmen. Personal servants.
Cullion. A despicable creature. Italian = *coglione.* Compare, "Away, base cullions" (*2 Henry VI.*, i. 3). *Cully* is a contraction of this word.

102. *Melusina.* The most famous of French mythical characters. Having enclosed her father in a high mountain for offending her mother, she was condemned to become every Saturday a serpent from her waist downwards.
Vespers. Evening prayers; the sixth hour of the Roman breviary.

CHAPTER VIII.

104. *Caserne.* Barracks.
Primes. The first church service of the day. Lat. *primus* = first.
Partisan. A long staff headed by a blade or small axe.

105. *Prickers.* Huntsmen.
Minutiæ. Small details.
Punctilious. Careful to the smallest point. Lat. *punctum.*

106. *Leading staff.* The baton or staff of office carried by a marshal.

108. *Emoluments.* Profits and incomes derived from offices.
Benefices. Livings; positions in the church.

109. *Cope.* An ecclesiastical vestment resembling a cloak. Cognate with *cape.*

110. *Tonsor.* Barber.

111. *Volée.* Lit. flight, scope, power.

112. *Decorum.* Fitting or proper behaviour.
Year, day, hour, and minute of your birth, etc. This was for the purpose of having his horoscope or future career determined Louis firmly believed in this nonsense.

113. *Rosary.* A string of beads used in praying.

115. *Vestal.* A virgin; properly a maiden dedicated to the service of the goddess Vesta. Their work was to keep alight the sacred fire in the temple night and day.

116. *Pursuivant.* An attendant on the heralds; one of the third and lowest of heraldic officers.
Hainaulter. One from Hainault, a province in Belgium.

117. *Nail his gauntlet.* The gauntlet or glove thrown down, or, as in this case, nailed to a gate, was a challenge which a man could not refuse without being considered a coward.
Dennis Montjoye. The war-cry of the French. "Montjoye is a corruption of Mons Jovis, as the little mounds were called which served as direction posts in ancient times; hence it was applied to whatever showed or indicated the way, as the banner of St. Denis" (*Brewer*).
Marry = By the Virgin Mary.
Ever-open gate of Calais. This town remained in English possession from the reign of Edward the Third till the reign of Mary.

118. *Most Christian King.* Louis the Eleventh was so styled by Pope Paul, 1469; since which time it was universally adopted by the French kings, though they often had not the remotest claim to such a title.
Beati pacifici. Blessed are the peaceful.

120. *Golden Fleece.* An order of knighthood instituted by Philip the Third, Duke of Burgundy, in 1429. The selection of the fleece as a badge may have some reference to the wool trade of Flanders, then a part of the Burgundian dominions.
Letters of credence. Credentials; documents showing that he really was what he stated himself to be.
Panoply. Covering.

123. *Bead-roll.* (A.S. *bed*, a prayer.) Little balls strung on a string were used to keep count of the number of prayers said—one prayer for each bead. Hence "to tell one's beads."

124. *Short shrift.* The *shrift* was the act of *shriving* the dying—that is, hearing their confession and granting absolution. A *short shrift* means a quick death.
Toison d'Or. Golden Fleece, the chief herald.
Puissant. Powerful.

125. *Vive Burgogne.* Long live Burgundy.

129. *Hath harboured one.* Has discovered and noted the lair of one.

CHAPTER IX.

130. *Sigillum confessionis.* Seal of confession. What a Roman Catholic priest hears in the confessional is on no account to be divulged.

131. *Lie leaguer.* Lie hidden.
Astucious. Astute, clever, crafty.
As I ride my horse at the ring. Referring to the exercise of knights, who rode at full speed past a small ring suspended in the air, and endeavoured to pass the point of the spear through the ring as they passed. A similar exercise to our tent-pegging.

133. *Unharboured.* Disturbed and driven out of its hiding-place.
Caustic. Biting; fond of inflicting pain on others.

135. *Gambade.* Gambol.
Angelo. A famous riding-master.

137. *Palfrey.* A small saddle-horse, as distinguished from a war-horse.

138. *Rencontre.* Unexpected meeting.

140. *Orisons.* Prayers. Lat. *Oro*, I pray.

141. *Quarry*—that is, the boar. A term used in falconry for the prey which the bird strikes; not connected with *quarry*, a place where stones are hewed.

OUR CERTIFICATE COURSE FOR 1902.

BY GEORGE COLLAR, B.A., B.SC.,

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TEST QUESTIONS ON LAST MONTH'S WORK.

Theory of Teaching.

1. Draw up a scheme for teaching grammar and composition simultaneously.
2. How does the kindergarten system satisfy the child's psychological needs?
3. How may children be educated—according to Locke—through their toys?

Arithmetic.

1. Explain the terms—inverse proportion, premium, policy, and covered insurance.
2. For how much must a ship, worth £84,500, be insured, at 1½ per cent., so as to recover the value of the ship and the premium, in case of loss?

English Literature.

1. Sketch Macbeth's character, illustrating your answer by quotations from the play.
2. Trace the development of Macbeth's character, as it is modified by successive circumstances.

Euclid.

1. If the quadrilateral ABCD, inscribed in a circle, have the side AB parallel to CD, show that AC is equal to BD, and AD to BC.
2. If points P and Q be taken in two fixed straight lines, OA, OB, such that the sum (or difference) of OP and OQ is constant, show that the locus of the middle point of PQ is a straight line.
3. E and F are the middle points of the sides AB and CD of the parallelogram ABCD; show that the diagonal AC is trisected by DE and FB.

French.

1. What do you mean by "primitive tenses"? Describe the manner of forming the future indicative and the present subjunctive.
2. Translate into French :—

The exterior of this unhappy prince was in no respect distinguished by personal advantages; and in mind he was of a gentle, mild, and beneficent disposition—qualities which were visible even through the veil of extreme dejection with which his natural character was obscured.

3. Translate into English :—

J'ai trouvé quelquefois, parmi les plus beaux arbres
De ces monts où le bois est dur comme les marbres,
De grands chênes blessés, mais où les bûcherons,
Vaincus, avaient laissé leur hache dans les troncs ;
Le chêne, dans son nœud la retenant de force,
Et recouvrant le fer d'un bourrelet d'écorce,
Grandissait, élevant vers le ciel, dans son cœur,
L'instrument de la mort, dont il vivait vainqueur ;
C'est ainsi que ce juste élevait dans son âme,
Comme une hâche au cœur, ce souvenir de femme.

LAMARTINE, *Jocelyn.*

Political Economy.

1. What are the essential characteristics of "capital"?
2. Prove that capital must necessarily be used up and reproduced.

SYLLABUS AND NOTES FOR FEBRUARY.

English Composition.

Study Nichol, Part IV., chap. iii., "On the Order of Words," and study examples from selections in prose and verse, in order to see how clearness and force are ensured by following the rules given in this chapter.

Prepare essays on :—

1. Good manners.
2. A soft answer turneth away wrath.
3. Mercy becomes the throned monarch better than his crown.

Theory of Teaching.

(*a*) Finish the chapter on the teaching of languages. Perhaps a few only of our readers will have an opportunity of teaching languages; but many are studying a language for themselves, and they will find great help in this section.

The methods of teaching history should be studied this month. Few subjects in the curriculum of the elementary school ought to be more popular than history. In the past, however, it has received very little attention, and this is probably owing to the fact that the purpose of teaching history in the elementary school was misunderstood. The order in which the faculties affected by history teaching are developed is—(1) imagination; (2) memory; (3) judgment. The mistake so often made consists in requiring from little children the kind of historical study suitable for university students. The causes which have produced a certain result are generally so many and so complicated that it is impossible for young children to trace them; and when children say that a certain event is the necessary consequence of certain other events, they are generally repeating at second-hand the opinions of their teachers. In the elementary school, the chief use of history is to provide a discipline for the imagination and a training for the memory.

Particular attention should be paid to the claims of the chronological as against the reverse order of teaching history, also to the connection between geography and history, and to the use of historical poetry and novels.

(*b*) Study Dexter and Garlick, chaps. xviii.–xx. The teacher has to cultivate the sentiments of his pupils; to teach that high intellectual power is a thing to be desired in itself, apart from any power it confers of increasing one's wealth; to cultivate that æsthetic feeling which makes the pupil recognise that "A thing of beauty is a joy for ever," and to make the pupil see by intuition that certain courses of action are to be desired because they are morally right. The careful study of these sentiments will pave the way for dealing with the difficult question of the will.

(*c*) Locke's *Thoughts*, Sections 147–161. While fully agreeing with all that Locke says about the relative values of moral and intellectual training, we must still remember that Locke writes as a private tutor, and not as a schoolmaster or a class teacher; and that as a tutor generally lives in the house with his pupil, he takes a larger share of the parents' responsibility for the child's moral training than a teacher possibly can do.

We have made advances upon the details of Locke's plans for teaching the letters, but fully recognise the importance of making this work as pleasant as possible for the children. So also, when Locke advises certain books for children to read, he is guided by the principle that the subject-matter should be interesting; and we must remember that in Locke's days the choice of books for children was terribly circumscribed, in comparison with the results of the efforts of writers and publishers of the present day.

Locke's advice respecting writing is good, inasmuch as it leads to the analysis of difficulties—giving, first, finger-drill with the pen, and then drill in sitting properly. It is now, however, generally recognised that the work of holding the pen is best performed by the thumb and second finger; and a good exercise in pen-drill is to make the children hold the pen between the thumb and second finger, and move it about, the index finger being raised. This finger may afterwards be allowed to rest on the pen, and the children will see that it is not engaged in *holding* the pen, although it may give *pressure* as required. Opinions differ with respect to the use of tracing, but most teachers agree with Locke in using tracing with beginners. Its chief value is that it secures co-ordination between the hand and the eye, without being too much of a tax upon the eye, and it trains the muscles of the hand. It is urged as an objection that children are apt to begin the letters in the wrong place, and so get into bad habits. But this is the case with the other method, unless they are taught where to begin. Although Locke associates drawing with writing, yet he urges that drawing should be taught, because it is "a thing very useful to a gentleman in several occasions." The educational rather than the utilitarian aspect of the teaching of drawing has now come into prominence, and we now insist on the teaching of drawing as a means of hand and eye training, and also as a means of expressing thought, although the latter view is as yet adopted by only a few teachers.

Arithmetic.

Theory of interest, simple and compound, and of discount, true and banker's.

English Literature.

The character of Lady Macbeth is second in importance only to that of Macbeth himself, even if we do not allow it preco-

dence. Her character is one of the elements that go to the making of his; and not only is it a very difficult character to understand, but different authorities and different actresses have given very different renderings of it. It is particularly important that each statement should be illustrated by a quotation. In the first place, I think we must put aside the common opinion that Lady Macbeth is *naturally* cruel and inhuman: it is the affection for her father that restrains her from striking the fatal blow at Duncan.

"Had he not resembled
My father as he slept, I had done't" (ii. 2).

So also the following passage, though frequently misunderstood, really shows her motherly love for her children:—

"I have given suck, and know
How tender 'tis to love the babe that milks me:
I would, while it was smiling in my face,
Have plucked my nipple from his boneless gums,
And dashed the brains out, had I so sworn as you
Have done to this" (i. 7).

If Lady Macbeth were simply admitting that she was so inhuman that the dashing out of the brains of her own child, as it lay smiling in her face, would be a commonplace act, then the passage loses its point, for she could claim no credit for an act which came naturally to her. But we must not pass lightly over the first two lines. Lady Macbeth tells how keenly she felt the tenderness of a mother's love towards her babe, but she feels so strongly the obligation to keep her promise, that she would have done so even had it compelled her to commit an outrage against her strong maternal instinct.

We must rather look upon Lady Macbeth as a woman who had been left very much alone, deprived for long periods of the society of her husband and of suitable companions. Hence she gives way to broodings, and lets ambition fill her with day-dreams. So, on the receipt of her husband's letter, she says,—

"Glamis thou art, and Cawdor; and shalt be
What thou art promised" (i. 5).

And, before the arrival of her husband, she prepares herself for the execution of her plan to secure the fulfilment of the witches' prophecy.

"Come, you spirits
That tend on mortal thoughts, unsex me here,
. . . . . .
To cry 'Hold, hold!'" (i. 5).

The salute she gives her husband is prompted by these dreams of ambition.

"Great Glamis! worthy Cawdor!
Greater than both, by the all-hail hereafter!" (i. 5).

Another point that must be noticed is her great presence of mind, and her quickness in dealing with a new situation.

"Thy letters have transported me beyond
This ignorant present, and I feel now
The future in the instant" (i. 5).

So, after the murder of Duncan, she quickly conceives the idea of smearing

"the faces of the grooms withal;
For it must seem their guilt" (ii. 2).

And when Macbeth sees the ghost of Banquo at the feast, his wife quickly excuses his strange conduct,—

"Sit, worthy friends:—my lord is often thus,
And hath been from his youth" (iii. 4).

The readiness with which she is startled by slight noises on the evening of Duncan's murder really shows a susceptible conscience, and so do the utterances made in her sleep.

The student will readily find quotations to illustrate her *strength of will* and *masculine firmness*, the way in which she is dominated by *self-interest* and *desire for family aggrandisement*.

Geometry.

Women.—Prepare Euclid III. 20–27. In modern geometry, points on the circumference of the same circle are said to be *concyclic*; and the third book of Euclid is very much simplified if its propositions are regarded as a study of the conditions under which given points must be concyclic, and of the results which follow from the hypothesis that given points are concyclic.

Men.—Revise the first nineteen propositions in Book III., and see above note.

Trigonometry.

Study the chapters on determining heights and distances. The best plan for beginners is to write a fraction having the unknown quantity as the numerator and the known quantity as the denominator, and then say what function this is of the given angle.

Example 1.—The altitude of a tower is observed to be 30° at a point 100 yards from its foot. What is the height of the tower?

If AB is the height of the tower, and C the position of the observer, then ABC is a right-angled triangle, of which AB is the perpendicular, BC the base, and AC the hypotenuse, while the angle at C = 30°.

$$\therefore \frac{AB}{100} = \tan 30° = \frac{1}{\sqrt{3}}.$$

$$\therefore AB = \frac{100}{\sqrt{3}} = \frac{100\sqrt{3}}{3} = 57{\cdot}735.$$

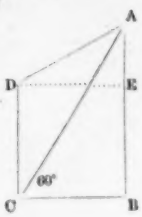
Ans. 57·735 ft.

Example 2.—The angles of depression of the top and bottom of a column observed from a tower 108 feet high are 30° and 60° respectively; what is the height of the column?

From the triangle ABC we have

$$\frac{BC}{108} = \cot 60° = \frac{1}{\sqrt{3}}.$$

$$\therefore BC = \frac{108}{\sqrt{3}}.$$



$$\text{But } DE = BC = \frac{108}{\sqrt{3}}.$$

$$\therefore \text{ in the triangle ADE, } \frac{AE}{DE} \text{ or } \frac{AE}{\frac{108}{\sqrt{3}}} = \tan 30° = \frac{1}{\sqrt{3}}.$$

$$\therefore AE = \frac{108}{3} = 36.$$

But DC = EB = AB − AE = (108 − 36) ft. = 72 ft.

And so on in other cases. If the problem involves more than one triangle, it is generally best to begin with the triangle of which one side is given, and put the side which is common to that and the next in the form of a fraction which can be equated to a function of a given angle, and thus the value of a side *common* to the two triangles can be determined. If there are only two triangles, the length required can then be found as in Example 1. If there are more, then we must proceed in the same manner to find the length of the side common to the second and third, etc., until we reach the last triangle.

Political Economy.

Read very carefully Fawcett, Section III., chap. iv. The question of trades unions is a very difficult one, and it is important to consider in what ways trades unions do good, and in what ways they are harmful. Naturally trades-unionists claim that none of their principles are harmful; and if such people were to openly advocate injurious practices, the law would interfere. Two objects that most unions have are distinctly beneficial to the individual workman, and in no way prejudicial to any one else—namely, (1) the provision of sick benefit, including, in many cases, superannuation; and (2) assistance when out of employment. It might be urged that a workman in good health and remunerative employment could make provision for sickness, old age, or loss of employment without combination; but as these are best dealt with under the law of averages, there is an advantage in combining and treating them as a matter of insurance; and the rules of the union generally require reports from fellow-members, who are interested in guarding the funds, before meeting a call for help, and thus malingering is checked. But these provisions may be made through "benefit societies" which are not "trades unions." One function of the latter is to obtain the highest possible remuneration for the workmen's labour. Now, an advance in wages can seldom be obtained as readily by individual application as by combined effort. If one workman is dissatisfied with his wages, his employer can generally replace him by one who is; but if all the men in a trade refuse to work without an advance, the trade must come to a standstill, unless the employer finds that from the total profits a larger share can be devoted to the wages fund. Should the union make a demand which it is impossible to meet, it is bound to fail, and this with great loss to its collective funds, and injury to its individual members. The act of combination, therefore, has nothing improper in it, and can only succeed in accordance with the fact that the law of supply and demand calls for an equitable division of profits between capitalist and labourer. There are other ways in which unions seek to benefit their members, which are less defensible:—

(1) By limiting the competition in their own trade by making it difficult to enter. Thus not more than a certain number of apprentices are allowed in many trades. When this succeeds it benefits the particular trade, but causes a rise in the price of commodities, and works harm on other trades, and gives other countries an advantage in the competition. (2) By limiting the amount of work that each man may do. On the part of the unionists it is urged that this is beneficial, as it (*a*) provides work for a larger number of people, and (*b*) removes the temptation to scamp work. But, on the other hand, it is injurious (*a*) to the better class of workman, because it prevents him from earning more than his mediocre or idle fellows; (*b*) to the country, because it limits the total production. The reports of observers who have compared the conditions of various industries in this country with those in America, where trades unions have less influence, are distinctly against the unionist's contentions in this point. (3) Another way in which unions endeavour to advance the interests of their members is by strictly forbidding them to do the work of another trade. Thus if a chimney-pot blows down and damages the roof, the bricklayer who uses the trowel to set the chimney-pot must not touch the tiles, nor must the tiler use a trowel and do the work of setting the chimney; and thus two men have to come to do work which might have been done as effectively and more economically by one. The fallacy of the argument that such wasteful expenditure is "good for trade" has already been exposed.

But just as individuals sometimes resort to improper means to attain their ends, so also combinations may resort to means which infringe the rights and liberties of others. Among these may be mentioned force and undue influence exerted on non-members in order to induce them to join the union, and injury to the property of employers. It has been decided that a union is responsible for harm done by its officials, and that a person injured by the action of a union may obtain damages, not merely from the individual who does the mischief (and who very often is unable to pay damages), but from the funds of the union that sanctions the harm. An appeal has been lodged against this decision, and we advise our readers to watch the outcome in the newspapers.

French.

The natural way of learning a language is by the ear. Written symbols came into use long after the sounds they represent, and are, after all, merely marks to represent sounds. If this fact is borne in mind, many difficulties of French accidence will vanish; for they are difficulties which never occur in the spoken language, and are only discovered when we write. We therefore must impress on our readers the two following rules, which connect written with spoken French:—

1. In dividing a word into syllables, each consonant must be put as far from the beginning as possible—for example, *dé-pu-té*, not like the English *dep-u-ty*. Particular attention must be paid to this fact when dealing with prefixes; thus we say *in-com-plet*, *in-fi-dè-le*, and *ab-so-lu*, but *i-nu-ti-le* and *a-bo-lir*, making no exception to the rule. In English we generally pay more attention to the derivation than to the pronunciation, and treat the prefix as a separate syllable; but in French we never put a consonant in the first syllable if it can possibly go in the second, nor in the second if it can be pronounced in the third, etc. To such an extent is this principle carried out, that the last consonant of a word is carried into the first syllable of the next, if possible—for example, *Nous_avons_un_oncle.*

2. The stress or accent on every syllable of a word (except mute syllables) is almost the same. A Frenchman's chief difficulty in learning to speak English consists in finding which is the right syllable of a word to accent; compare *education*, *difficulty*, *veterinary*, *inconsistent*, *produce*, *produce*. Now, French is very much easier to speak than English, because all syllables have practically the same amount of emphasis. There is, however, one syllable which receives a special stress, though nothing like so great as in English. This stress is called the *tonic accent* (which must not be confused with the marks ´ ` ^ used in writing). We shall see later on that this tonic accent has persisted from the Latin, and is of great importance in studying the derivation of French words. The rule for the place of the tonic accent is as follows:—Place the tonic accent on the last syllable of the word, unless that syllable is mute, in which case it comes on the last but one. It can never come further from the end than this. If the last syllable but one is also mute, then it must be modified to make it capable of taking the tonic accent.

The student who has thoroughly grasped these rules for pronunciation can understand the reason for many things that he previously regarded as irregularities. Thus, in the masculine *ber-ger*, the *r* belongs to the second syllable; but in the feminine *ber-gè-re*, it belongs to the third (Rule 1). But as the last syllable *-re* is mute, the accent must come on the last but one; and as *-ge-* would also be mute, we must change it to *-gè-*. Another way of making a syllable sonorous is to close it by a consonant. Thus, if we formed the feminine of *mu-et* and *cru-el* in the ordinary way, we should get *mu-e-te* and *cru e le* (Rule 1); but we can make the last syllable but one sonorous by adding *t* and *l* respectively—*mu-et-te*, *cru-el-le*. The seeming irregularity of many verbs of the first conjugation is thus easily accounted for. They are not irregular when conjugated by the voice, but only when conjugated by the pen. The following verbs will illustrate the above remarks:—*mener*, *appeler*, *jeter*, *celer*, *peler*, *acheter*, *marteler*, *promener*.

Verbs in *-ier* are regular, but the regularity causes two i's to come together in the first and second persons plural of the imperfect indicative and present subjunctive—for example, *nous priions*, *vous priiez*. The feminine of the past participle of verbs in *-éer* is often asked for. It is quite regular, but a form with three consecutive e's makes students fear something is wrong—*La terre fut créée.*

The prior claims of the ear make us write also an *e* after *g* when followed by *a*, *o*, or *u*, in verbs in which the stem ends in *g*; and also oblige us to put a cedilla under the *c* in like cases when the stem ends in *c*.

OUR CERTIFICATE COURSE FOR 1903.

For Composition, French, Arithmetic, see our Course for 1902.

Test Questions.

1. How may the ventilation and heating arrangements of a school be made to work together?
2. What is a predicate? Distinguish carefully between the terms "predicate" and "finite verb."
3. Give an outline of the Roman conquest of Britain.
4. In what ways have the Roman occupation and Roman civilisation made themselves felt down to the present day?
5. Describe the manner in which river courses have been formed.

Theory of Teaching.

Study chap. iii. of the text-book. Make a list of the books required for registers and school records, and if you are not familiar with them from actual practice, ask your head-teacher to let you examine them and see how they should be kept. Do not be afraid of asking questions on this subject, as registration and record-keeping constitute a very important part of the teacher's work. The advice on the arrangement of classes and time tables is very important. Take exercises in these parts of the work. Imagine yourself in charge of a school with so many rooms and so many children, and draw up a time-table to suit the case. As the school buildings, number of children, and staff may vary indefinitely, no one model can be followed, but many problems may be worked out.

English.

Read carefully the papers on *Sir Roger de Coverley*. Make notes on the subject-matter, the style, and the delineation of character.

Prepare Nesfield, chaps. iii. and iv.

English History.

Study the history to the death of Alfred. In dealing with the Saxon invasion, avoid such sweeping assertions as, "The Britons were all driven into Scotland, Wales, and Cornwall." There can be no doubt that most of the men were exterminated in the parts in which the Saxons settled; but as the conquerors brought with them very few women, they must of necessity have taken wives from the subdued inhabitants, and thus a fusion of races was brought about. This view is supported by the fact that Celtic words that have survived in the English language have to do with household management, and not with the occupations of warriors and freemen—for example, *brat*, *curd*, *taper*, *prop*.

The conversion of the Anglo-Saxons to Christianity is an important matter; but the bad puns made by Gregory must be made to occupy their proper subordinate position. The spread of Christianity in England, and its effect upon the Saxons, are much more important. So great was the influence on the Saxons that we find them sending missionaries abroad, the most noted of whom were Boniface, who became Archbishop of Mentz; Willibald, the first Bishop of Friezeland; Adalbert, Bishop of Utrecht; and Williband, first Bishop of Bremen. Later on, Alcuin of York was invited to the court of Charlemagne, to carry out that monarch's schemes for the intellectual and spiritual advancement of his kingdom.

To understand English history, it is necessary to know a little of European history; and the student should read the account of the defeat of the Saracens by Charles Martel, which checked the Mohammedan invasion of Europe, in Creasy's *Fifteen Decisive Battles of the World*.

The life and reign of Alfred are important, and more must be known about them than the legends of the picture-book and the cakes. These legends are so very interesting that they deserve to be true. But, unfortunately for the story of Alfred being induced to read by his mother when he was twelve years old, his mother died when he was four; and even the excuse that it was perhaps his stepmother is not of much avail, for Judith was a little French princess nine years of age when Ethelwulf married her. It is most probable that she knew no Anglo-Saxon herself, and it is quite unlikely that she started a reading competition among her stepsons, who were mostly older than herself. Asser, moreover, relates that Alfred learned to read in the thirty-ninth year of his age. The story of the cakes can be traced no farther back than 1574. The *Saxon Chronicle* makes no mention of his hiding. Asser translated from the *Chronicle*; but the passage has manifestly been corrupted in the manuscripts that have come down to us, as it refers to the *Life of St. Neot*, which was written long after, and even this passage merely says that he once took refuge "with one of his own herdsmen"—evidently a trusty servant who knew him.

The waves of Danish invasion must be followed up, and Alfred's defensive warfare and subsequent victory and settlement of the country. Next note how he established social order—"Alfred's dooms"—and organised the defence of his country (*a*) by providing ships to meet the enemy at sea, (*b*) by building fortifications at strategetic points in case of emergency, and (*c*) the constitution of the *fyrd* or militia, so as to maintain an effective force without draining the labourers from the land. But his chief merit consists in having organised a system of education including not only the provision of a general education for every free-born youth, but a technical training for artificers. He gave great encouragement to learned men, and wrote several books himself.

GEOGRAPHY.

Study carefully the physical geography of Europe.

LONDON MATRICULATION.

JUNE 1902.

"HELPS" FOR THE LATIN PAPERS.

BY C. J. PHILLIPS, M.A.,
Stockwell Pupil Teachers' Centre.

ANSWERS TO TESTS ON CICERO FOR JANUARY.

(*The English translation given in these answers will be almost literal.*)

Chapter ix.

1. (*a*) "As to the orator, I dread lest he grow feeble through old age: for his art is (one) not merely of the intellect, but also of the lungs and bodily powers. No doubt that resonance in the voice becomes even more conspicuous, by some means or other, in old age, (that resonance) which I have not lost so far, and you see (my) years. But still there is a style of speech, becoming to an old man, quiet and unimpassioned, and the polished mellow oratory of an eloquent old man very often by itself wins for it a hearing; and if one could not attain to this oneself, yet one could teach it to a Scipio and a Laelius. For what is more delightful than old age surrounded by the enthusiasms of youth?"

(*b*) "I can remember how, when I was a boy, L. Metellus, who, after he had been appointed Pontifex Maximus, four years after his second consulship, presided over that priesthood for two and twenty years, was of such sound strength in the very latest period of life that he did not miss his youth."

2. *Elephanti* is gen. sing. (depending on *vires* understood), from *elephantus*, another form of *elephans* or *elephas*. (*N.B.*—Be sure you can decline this noun substantive in *full*.)

Provecta is nom. fem. sing. (agreeing with *prudentia*), from *provectus, -a, -um*, the past participle of *proveho, -ĕre, -vexi, -vectum*. With *est* it makes up the past indic. pass. tense. Literally it means "was carried forward," so "continued."

Stipata is abl. fem. sing. (agreeing with *senectute*), from *stipatus, -a, -um*, the past partic. pass. of *stipo, -are, -avi, -atum*. *Senectute* is ablative after the comparative *iucundius*.

3. (*a*) *Solitus est M. Cato negare se plus senem adulescentis vires desiderare quam adulescens tauri (vires) desiderarisset.*

(*b*) *Cyrus moriens affirmavit se saepe admiratum esse num senectus sua adulescentiâ imbecillior fuisset.*

Chapter x.

1. (*a*) "I am in my eighty-fourth year. I could wish indeed to be able to make the same boast as Cyrus made; but anyhow this I can say—not, of course, that I am as strong as I was when I was a private soldier in the Punic War, or when I was quaestor in the same war, or when I was consul in Spain, or when, four years afterwards, I fought the war through as military tribune at Thermopylæ, in the consulship of Manius Glabrio; but yet, as you see, old age has not altogether enfeebled me, not crippled me; the Senate does not have to go without my strength, nor the public platform, nor my friends, dependents, or guests.

"For I have never agreed to that ancient and admired proverb which bids you become an old man soon, if you would be an old man long. I should prefer, on the other hand, to be an old man for too short a time rather than be old before I (really) were so."

(*b*) "Life has a fixed course—Nature one path, and that a simple one; and to each period of life its own seasonableness has been given, so that both the instability of the boy and the impetuosity of the young man, both the steadiness of once settled manhood and the ripeness of old age, have each some natural fruit, which ought to be gathered in its own good time."

2. (*a*) *Dixit Agamemnon, apud Homerum, se malle unum Nestoris quam decem Aiacis similes habere.*

(*b*) *Num tu credis Milonem bovem humeris sustinere esse solitum?*

Chapter xi.

1. (*a*) "We must resist old age, Laelius and Scipio, and its deficiencies must be made up for by painstaking; we must fight, as against disease, so against old age; regard must be paid to health; we must employ moderate exercises; we must administer (to ourselves) only so much food and drink that our powers may be refreshed, not overwhelmed."

(*b*) "For on these conditions is old age honourable, if of its own power it protects itself, if it keeps its rights, if it has passed into bondage to no one, if it keeps control over its dependents up to its last breath."

(*c*) "I have on my hands the seventh book of the 'Origines;' I am gathering together every record of old times; I am finishing off just now especially the speeches belonging to all the famous law cases which I defended; I am dealing with the secular law respecting the augurs and the priesthood; I make a considerable use also of Greek literature, and, for the sake of exercising the memory, according to the custom of the Pythagoreans, I recall in the evening what I have said, heard, and done on each day."

2. *Exstitisset* is third person sing. pluperf. subj. act., from *exsto, -stare, -stiti, -statum*, or from *exsisto, -ĕre, -stiti, -stitum*. The pluperf. subj. is used in an unfulfilled conditional sentence in past time.

Instilles is second person sing. pres. subj. act., from *instillo, -are, -avi, -atum*. The subjunctive makes the idea a little more vague than the indicative would have done, "unless one were to pour in."

Emancipata is nom. fem. sing. (agreeing with *senectus*), from *emancipo, -are, -avi, -atum*. (*N.B.*—Read carefully your note on the meaning of this word in this passage.)

3. *Senex affirmavit has esse ingeni exercitationes, sine quibus* (or *quibus omissis*) *nos senes adulescentiae vires desideraturos esse.*

Chapter xii.

1. (*a*) "And that this might the more be realised, he used to bid (you) imagine a man actuated by as great bodily pleasure as could be enjoyed; he used to think that it would be doubtful to no one that (such a man), so long as he enjoyed pleasure to such an extent, would be unable to plan anything in his mind, or to effect anything rationally or deliberately."

(*b*) "In order that you should understand that, if we were not able to despise (mere) pleasure through the power of reason and wisdom, great gratitude ought to be felt to old age, which secured that what was not right was not pleasing either. For pleasure thwarts deliberation; it is fatal to reflection; blinds, so to speak, the eyes of the intelligence; and has no dealing with virtue."

2. *Aufert* is third person sing. pres. indic. act., from *aufero, -ferre, abstuli, ablatum*. (*N.B.*—*Aufero* is made up of *ab* and *fero*. Carefully distinguish it from *affero* (= *ad* and *fero*), *afferre, attuli, allatum*.)

Praestabilius is acc. neut. sing. (agreeing with *nihil*), from *praestabilior, -or, -us*, the comparative of *praestabilis, -is, -e*.

Eicerem is first person sing. past imperf. subj. act., from *eicio, -ĕre, -ieci, -iectus* (*e* or *ex* and *iacio* = "I cast"). The subjunctive expresses consequence.

Exoratus is nom. sing. masc. (agreeing with *ille*), past partic. pass., from *exoro, -are, -avi, -atum.*

Neutiquam is an adverb, rarely met with in Latin of Cicero's date, meaning "by no means."

3. (*a*) *Nullum est scelus ad quod suscipiendum libido voluptatis homines non impellat.*

(*b*) *Vix satis constat num invitus Cato, censor, L. Flaminium ex Senatu ejecerit.*

Answers to Test Questions set in January Number.

1. *Si tu nobiscum ibis, cras domum redierimus.*
2. *Noli respondere, si nescis.*
3. *Si scivissem quis esses, statim tibi paruissem.*
4. *Nisi ego advenero, noli statim proficisci.*
5. *Si fratrem meum videam, nesciam quid agam* (or *quid oporteat me facere*, or *quid faciendum sit*).
6. *Miserum hominem, si modo me certiorem fecisses!*
7. *Si domum tuam, te absente, advenit, non oportuit eum libri oblivisci.*
8. *Quo eas, si ex urbe excedas?*
9. *Dicit se pecuniam, si veniae, tibi daturum esse.*
10. *Nonvult orationem habere; si tamen tu ores ut id faciat, pro certo habeo te impetraturum esse.*

Test Paper in Grammar.

1. Give the gender, meaning, and genitive singular of *echo, vas, iecur, domus, heros.*
2. Decline together *ingens paries, tres boves, idem mare.*
3. Give the Latin for:—
   One or the other of the two sisters.
   Who was present? What man or what woman?
   There were in the army two hundred standards, one thousand chariots, and two hundred thousand men.
4. Give the positive of *optime, audacius, nequissimus*, and the superlative of *providus, gracilis, senex.*
5. Give the first person singular of the following tenses:—the imperfect subjunctive of *fio* and *malo;* the perfect subjunctive passive of *sepelio, mordeo, lavo, pingo.* Write out in full the pres. indic. act. of *volo, fero, edo.*
6. Give the pres. infin. perf. indic. and supine or past participle of *misereor, pasco, pendeo, obliviscor, meto, soleo, gigno, sero.*

Grammar Revision for February.—The regular verbs, together with *sum, eo, fero, volo, nolo, malo, eo, fio, possum*, and the irregulars of the first conjugation.

Subject for February.

Instead of taking a single Latin idiom and practising the use of that only, we now propose, with a view to condensing the work, to give in each number a list of miscellaneous idiomatic sentences, and to supply translations and explanatory notes on them in the next number.

Translate into Latin:—

1. You ought to have obeyed the general at once.
2. Cicero used to say that he often wondered why philosophers despised poets, and poets philosophers.
3. The leader of the Gauls determined, on the receipt of this news, to burn all the buildings in the village, and throw his army across the Rhone before the Romans should be able to set out.
4. If you had not told the slave where you were going to, no one would have found out that you had left the city.
5. We must spare our enemies and help our friends.
6. I'm afraid he won't come if he finds out when the election for the consulship takes place.
7. The number of our enemies is as great to-day as I have ever known it to be.
8. He is not the kind of man to do such things.
9. Did I feel sure that you would be appointed tribune, I should regret my decision.
10. Does any one doubt that he would have murdered the consuls if he had been allowed to be present?

Work from Cicero for this Month.

Chapter xiii.

1. Translate:—
   (*a*) *Quod ex eo audientis.....dedisset.*
   (*b*) *Caret epulis.....delectari potest.*
   (*c*) *Neque enim.....probare videantur.*
2. Put into Latin:—
   (*a*) There is a philosopher at Athens who teaches that everything which we do ought to be referred to pleasure.
   (*b*) He said that when a boy he had often seen C. Duillius, who was the first Roman to defeat the Carthaginians at sea, going home from banquets.

Chapter xiv.

1. Translate:—
   (*a*) *Me vero.....producimus.*
   (*b*) *Ut Turpione.....quantum sat est.*
   (*c*) *M. vero Cethegum.....potest esse maior.*
2. Parse:—*restant, rorantia, dimetiendi.*
3. Put into Latin:—
   Do you not think we ought to be grateful to old age for taking away from us the love of food and drink, and increasing in us the love of conversation?

Chapter xv.

1. Translate:—
   (*a*) *Quamquam me quidem.....vallo aristarum.*
   (*b*) *Itaque ineunte vere.....aspectu pulchrius?*
2. Parse:—*viviradices, gustatu, sollertius.*
3. Explain the mood in *procreet, proferam, scriberet.*

Chapter xvi.

1. Translate:—
   (*a*) *Curio ad focum.....aurum imperare.*
   (*b*) *Mea quidem sententia.....redeamus.*
   (*c*) *Sibi habeant.....senectus potest.*
2. Parse:—*aranti, referta, conditiora.*
3. Put into Latin:—
   (*a*) I do not think it glorious to possess gold, but to command those who possess it.
   (*b*) Cicero says that it was when about to begin ploughing that Cincinnatus was told of his appointment to the dictatorship.

NOTES AND JOTTINGS.

English Course for L.L.A.

We have received one or two requests for a course in English literature for the L.L.A. degree. We shall be pleased to start such a course should the demand for it justify us in devoting the necessary space to that subject. If our readers and intending readers who desire help in this direction will kindly send a line to the Editor, we will give the matter our careful consideration.

Education in the United States.

Those of our readers who had an opportunity of inspecting the education contribution of the United States to the Paris Exhibition will be pleased to know that the series of monographs by specialists dealing with every particular of education in the United States has now been published, under the able editorship of Dr. Butler, Professor of Education in Columbia University, New York. The work is published in two volumes, under the title of *Education in the United States*, and may be obtained of the American School-book Agency (G. Arundel).

Education in Spain.

Spain is at last waking up to the need of education for the masses, unless the country is to fall still farther to the rear. A commission has now been appointed, and has set to work to ascertain what reforms are needed, and we hope soon to be able to give a paper on the subject of education in Spain.

Commercial Law.

The Commercial Law of England. By J. A. Slater, B.A., LL.B. This book might have been called "Commercial Law and Practice," as it is at once both a guide in matters of commercial practices and an authoritative statement of the law applying to commercial transactions. Of the reliability of the advice given there seems no doubt, for not only are the Acts of Parliament quoted and referred to, but the leading cases in which the interpretation of those Acts has been laid down are also quoted. The book should form both a valuable text-book for students preparing for a commercial life, and also a handy book of reference in the merchant's office.

It forms a valuable addition to the many useful books on commercial subjects published by Sir Isaac Pitman and Sons.

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Monachus.—O, A, D, C, B are five points in a straight line. The lengths of OA, OB are the roots of the quadratic $x^2 - 2ax + b^2 = 0$. C is the middle point of AB, and OD is a mean proportional between OA and OB. Prove that $CD = a - b$.

$$x^2 - 2ax = -b^2.$$
$$x^2 - 2ax + a^2 = a^2 - b^2.$$
$$x - a = \pm\sqrt{a^2 - b^2}.$$

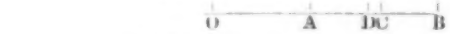
Hence the roots of the given quadratic are $a + \sqrt{a^2 - b^2}$ and $a - \sqrt{a^2 - b^2}$. Then by the question we must have $OA = a - \sqrt{a^2 - b^2}$ and $OB = a + \sqrt{a^2 - b^2}$.

Since OD is a mean proportional between OA and OB, we have OA : OD :: OD : OB.

$\therefore OD^2 = OA \cdot OB$.

Hence $OD^2 = (a - \sqrt{a^2 - b^2})(a + \sqrt{a^2 + b})$
$= a^2 - (\sqrt{a^2 - b^2})^2 = b^2$.

$\therefore OD = b$.



$CD = OC - OD$.

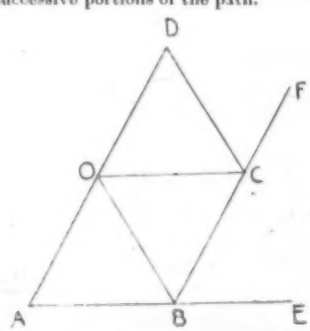
And $OC = \frac{1}{2}(OB + OA)$
$= \frac{1}{2}\{a + \sqrt{a^2 - b^2} + a - \sqrt{a^2 - b^2}\} = a$.

$\therefore CD = a - b$.

H.A.—A blindfolded man continually walks straight a certain distance, and then wheels left through a constant angle. Prove, by elementary geometry, that if the angle be a submultiple of four right angles, he will return to the starting-point.

(Prof. R. W. Genese, *Mathematical Gazette.*)

Let AB, BC, CD . . . represent in magnitude and direction the successive portions of the path.



Produce AB to E, BC to F. Then, by the question, each of the angles CBE, DCF is equal to $\frac{1}{n}th$ of four right angles, n being a positive integer. Therefore the angle ABC = the angle BCD. Bisect the angles ABC, BCD by BO, CO, intersecting in O, and join OA, OD. Then OB = OC (Euclid I. 6). Again, AB, BO = CB, BO each to each, and the angle ABO is equal to the angle CBO (const.).

$\therefore$ AO = CO, and the angle AOB is equal to the angle BOC. Similarly, OB is equal to OD, and the angle BOC equal to the angle COD. Hence $OA = OB = OC = OD = \ldots$, and $\angle AOB = \angle BOC = \angle COD = \ldots$

Again, the angles OAB, OBA are together equal to the angle ABC. Hence the angle AOB is equal to the angle CBE. Therefore each of the angles AOB, BOC, COD . . . is equal to $\frac{1}{n}th$ of four right angles.

Hence the n successive portions of the path are the bases of isosceles triangles on equal bases, and having their vertical angles in the point O, and each equal to $\frac{1}{n}th$ of four right angles. The successive portions of the path will therefore form a closed polygon of n sides.

Mack.—A sum of £1700 was borrowed, and is to be paid back in two years by two equal annual payments, allowing interest at 4 per cent. Find the amount of the annual payments.

(*Pitt Press Arithmetic.*)

Suppose a sum was borrowed, and repaid in accordance with the conditions of the question, and that each of the two equal annual sums paid back was £100. Then the sum borrowed would have been (1) the P.W. of £100 due in one year, at 4 per cent., together with (2) the P.W. of £100 due in two years, at 4 per cent.

The P.W. of £100, due in one year, at 4 %, is $£\frac{10000}{104}$.

The P.W. of £100, due in two years, at 4 %, is $£\frac{10000}{108{\cdot}16}$.

Hence, if $£\left(\frac{10000}{104} + \frac{10000}{108{\cdot}16}\right)$ is borrowed, each of the two equal annual sums to be paid back is £100.

Therefore, when £1700 is borrowed, each of the two equal annual sums to be paid back will be

$$£\frac{1700}{\frac{10000}{104} + \frac{10000}{108{\cdot}16}} \times 100;$$

that is, $£\frac{17}{\frac{1}{104} + \frac{1}{108{\cdot}16}}$;

that is, $£\frac{17 \times 104 \times 108{\cdot}16}{212{\cdot}16}$;

that is, $£\frac{17 \times 104 \times 10816}{21216}$;

that is, $£\frac{17 \times 13 \times 10816}{2652}$;

that is, $£\frac{17 \times 10816}{204}$;

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J. Calver.—Two weights, of 7 oz. and 9 oz., are connected by a string 40 feet long, which is hung over a smooth pulley so that

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the 7 oz. weight touches the ground. When the system has been in motion for two seconds the string is cut, and both weights reach the ground at the same time. Find the height of the pulley from the ground.

(Jessop's *Elements of Applied Mathematics.*)

Let x feet be height of the pulley above the ground, and y feet the height of the 9 oz. weight at the beginning of motion. The acceleration of the 9 oz. weight vertically downwards is $\frac{9-7}{9+7} \cdot g$; that is, $\frac{1}{8} \cdot 32$, or 4 feet per second per second.

Hence the acceleration of the 7 oz. weight vertically *downwards* is -4 feet per second per second.

The length of the path described by either body in the first two seconds is $\frac{1}{2} \times 4 \times 2^2 = 8$ feet.

At the instant the string is cut the velocity of the 9 oz. weight is $4 \times 2 = 8$ feet per second vertically downwards, and the velocity of the 7 oz. weight is $-4 \times 2 = -8$ feet per second vertically *downwards*.

Let t be the time in seconds which elapses after the cut before the weights reach the ground.

Now, at the instant the string is cut, the 7 oz. weight is 8 feet, and the 9 oz. weight is $(y-8)$ feet, from the ground.

$$\therefore 8 = -8t + \tfrac{1}{2} \cdot 32t^2, \quad \ldots\ldots (1)$$

$$\text{and } (y-8) = 8t + \tfrac{1}{2} \cdot 32t^2. \quad \ldots\ldots (2)$$

From (1) we find $t = 1$ second. Substituting this value of t in (2), we find $(y-8) = 24$. $\therefore y = 32$ feet.

But $2x = 40 + y$. $\therefore x = 36$ feet.

Pend.—Mix ale at 2s. 8d., 2s., and 1s. 10d. per gallon with water so that the mixture may be sold at 1s. 6d. per gallon.

(Pendlebury's *Arithmetic.*)

This question is indeterminate, and admits of an infinite number of answers.

Take any number of gallons you please of each kind of ale, multiply the excess of the price over 1s. 6d. by the number of gallons taken, add these three results together, and the number of times that the sum contains 1s. 6d. is the number of gallons of water to be added.

Molim.—If $\tan^2 x + \sec 2x = \frac{7\sqrt{3} - 10}{\sqrt{3}}$, prove that $\cos 2x = -\frac{5 + 4\sqrt{3}}{23}$.

(Cambridge Entrance.)

$$\sec 2x = \frac{1}{\cos 2x} = \frac{1}{\cos^2 x - \sin^2 x} = \frac{\cos^2 x + \sin^2 x}{\cos^2 x - \sin^2 x} = \frac{1 + \tan^2 x}{1 - \tan^2 x}.$$

Substituting in the given equation, we have—

$$\tan^2 x + \frac{1 + \tan^2 x}{1 - \tan^2 x} = \frac{7 \times 3 - 10\sqrt{3}}{3}.$$

Denoting $\tan^2 x$ by y, we have $y + \frac{1+y}{1-y} = \frac{21 - 10\sqrt{3}}{3}$.

$$\therefore 3(y - y^2 + 1 + y) = (21 - 10\sqrt{3})(1 - y).$$

$$\therefore 3y^2 - 6y - 3 = (21 - 10\sqrt{3})(y - 1).$$

$$\therefore 3y^2 - (27 - 10\sqrt{3})y + 18 - 10\sqrt{3} = 0.$$

$$\text{Hence } y = \frac{27 - 10\sqrt{3} \pm \sqrt{\{(27 - 10\sqrt{3})^2 - 216 + 120\sqrt{3}\}}}{6}.$$

$$\therefore \tan^2 x = \frac{27 - 10\sqrt{3} \pm \sqrt{\{813 - 420\sqrt{3}\}}}{6}.$$

Let $\sqrt{\{813 - 420\sqrt{3}\}} = \sqrt{a} - \sqrt{b}$.

$$\therefore a + b = 813, \text{ and } ab = 3 \times (210^2).$$

$$\text{Hence } b = \frac{132300}{a}.$$

$$\therefore a^2 - 813a + 132300 = 0.$$

$$a = \frac{813 \pm \sqrt{(813^2 - 529200)}}{2} = \frac{813 \pm 363}{2}$$

$$= 588, \text{ or } 225.$$

$$\therefore \sqrt{(813 - 420\sqrt{3})} = \pm(14\sqrt{3} - 15).$$

$$\text{Hence } \tan^2 x = \frac{27 - 10\sqrt{3} \pm (14\sqrt{3} - 15)}{6}$$

$$= \frac{12 + 4\sqrt{3}}{6}, \text{ or } \frac{42 - 24\sqrt{3}}{6}$$

$$= \frac{6 + 2\sqrt{3}}{3}, \text{ or } 7 - 4\sqrt{3}.$$

$$\text{But } \tan^2 x + \sec 2x = \frac{21 - 10\sqrt{3}}{3}.$$

$$\therefore \sec 2x = \frac{21 - 10\sqrt{3}}{3} - \frac{6 + 2\sqrt{3}}{3},$$

$$\text{or } \frac{21 - 10\sqrt{3}}{3} - \frac{21 - 12\sqrt{3}}{3}$$

$$= 5 - 4\sqrt{3}, \text{ or } \frac{2\sqrt{3}}{3}.$$

$$\therefore \cos 2x = \frac{1}{5 - 4\sqrt{3}}, \text{ or } \frac{3}{2\sqrt{3}}$$

$$= -\frac{5 + 4\sqrt{3}}{23}, \text{ or } \frac{\sqrt{3}}{2}.$$

Puzzled (Huddersfield).—Find the point on an ellipse when the angle between the tangent and the radius vector from the centre is a maximum or a minimum. Show that at such a point the circle on the radius of curvature of the diameter passes through the centre of the ellipse. (London B.Sc., 1900.)

Let a radius vector from the centre cut the ellipse in the point x', y', and let a' denote its length. Let the length of the semi-diameter conjugate to the diameter through x', y' be denoted by b', and let x'', y'' be the point in which it cuts the curve. By a well-known theorem in conics, the area of the parallelogram formed by a pair of conjugate semi-diameters of an ellipse and the tangents at their extremities is constant, and equal to ab. But if θ is the angle between the diameters, the area of the parallelogram is $a'b' \sin\theta$. Therefore $a'b' \sin\theta = ab$.

Hence $\sin\theta$ is least when $a'b'$ is greatest.

Now $a'^2 + b'^2$ is constant, being equal to $a^2 + b^2$.

Therefore $a'b'$ is greatest when $a' = b'$.

Hence the acute angle between two conjugate diameters of an ellipse is a minimum (and therefore the obtuse angle a maximum) when the diameters are equal; and the angle between any radius vector and the diameter conjugate to it is equal to the angle between the radius vector and the tangent at its extremity.

Let ϕ and $\phi \pm \frac{\pi}{r}$ be the eccentric angles of the points (x', y'), (x'', y'').

Then $a'^2 = a^2 \cos^2\phi + b^2 \sin^2\phi$.

$$b'^2 = a^2 \sin^2\phi + b^2 \cos^2\phi.$$

$$\therefore a'^2 - b'^2 = (a^2 - b^2)\cos 2\phi.$$

$$\text{Hence } a' = b' \text{ when } \phi = \frac{\pi}{4} \text{ or } \frac{3\pi}{4}.$$

The equations of the equal conjugate diameters are, therefore, $\frac{x}{a} = \pm\frac{y}{b}$.

Hence the required points are the four points in which the diagonals of the rectangle formed by the tangents at the extremities of the axes cut the ellipse.

Taking $\frac{x'}{a} = \frac{y'}{b}$, and substituting in the equation $\frac{x'^2}{a^2} + \frac{y'^2}{b^2} = 1$, we find $x' = \frac{a}{\sqrt{2}}$, $y' = \frac{b}{\sqrt{2}}$.

Now the centre of curvature of any point, $x' = a\cos\phi$, $y' = b\sin\phi$, on an ellipse, is $\frac{a^2 - b^2}{a}\cos^3\phi$, $\frac{b^2 - a^2}{b}\sin^3\phi$.

(See Loney's *Co-ordinate Geometry*, § 423.)

Hence, for the point $\frac{a}{\sqrt{2}}$, $\frac{b}{\sqrt{2}}$, the centre of curvature is $\frac{a^2 - b^2}{2\sqrt{2}a}$, $\frac{b^2 - a^2}{2\sqrt{2}b}$. The line joining this point to the centre (0, 0) is $x\left(y - \frac{b^2 - a^2}{2\sqrt{2}b}\right) = \left(x - \frac{a^2 - b^2}{2\sqrt{2}a}\right)y$, and this reduces to $y = -\frac{a}{b}(x)$. $\ldots\ldots\ldots\ldots\ldots\ldots$ (1)

But the radius vector from the origin which passes through x', y' is $y = \frac{b}{a}(x)$. $\ldots\ldots\ldots\ldots$ (2)

Then, since (1) and (2) are at right angles, it follows that a circle described on the radius of curvature of x', y' as diameter passes through the centre of the ellipse.

Diomedon.—A rower finds he can row up a stream 6 miles and back again in 2 hours 6 minutes when the stream is running 3 miles an hour. Find his rate of rowing in still water.

(*A New Arithmetic*, Christian and Collar.)

The difference of the rates of the boat's travel down and up is obviously 6 miles an hour. Since the rate in each case is the product of the same distance (namely, 6 miles) into

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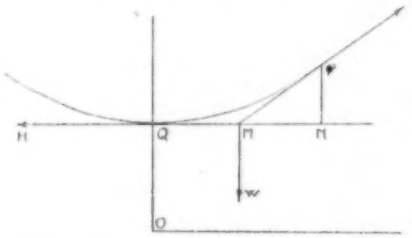
the reciprocal of the time taken, it follows that the product of 6 into the difference of the reciprocals of the times is equal to the difference of the rates—namely, 6. Hence the difference of the reciprocals of the times is equal to 1; and by the question the sum of the times is equal to $2\frac{1}{2}$. The times are, therefore, as $\frac{3}{2} : \frac{3}{4}$; that is, the time for the up journey is $1\frac{1}{2}$ hours, and for the down journey $\frac{3}{4}$ of an hour.

Hence the speed of the boat up-stream is $\frac{6}{1\frac{1}{2}}$ miles an hour—that is, 4 miles an hour—and therefore the speed in still water would be (4 + 3), or 7 miles an hour.

Undecided.—Prove that in the catenary curve formed by a flexible chain the difference of tension at two points is the weight of chain equal in length to the difference of level of the points, and prove that the length s and the height y, measured from the lowest point, are connected by a relation of the form $s^2 = 2ay + y^2$. Testing steel wire of specific gravity 8 in quarter-mile lengths to a tension of 50 tons per square inch, between two supports of equal height, show that the sag in the middle will be about 6·75 feet, and the slope at the ends about 1 in 49.

(London B.Sc., 1901.)



Referring the curve assumed by the chain to horizontal and vertical axes, with the vertex or lowest point Q as origin, let x, y be any point P on the curve.

The portion of chain QP may be regarded as a rigid body in equilibrium under the action of three forces—namely, the tension T at P acting in the direction of the tangent at P; the horizontal tension H at Q; and the resultant W of the forces of gravity on the mass QP, acting in the vertical through M, the intersection of the tangents at P and Q. Draw PN the ordinate of P. Let w be the weight of the chain per unit length. Then ws, the weight of QP, is given by ws, where s is the length of QP. The forces T, W, H are proportional to the sides MP, PN, NM of the right-angled triangle MPN.

$$\therefore T = \sqrt{(W^2 + H^2)} = \sqrt{(w^2s^2 + H^2)}. \quad . \quad . \quad . \quad . \quad . \quad . \quad (1)$$

Further, we have—

$$dx : dy : ds :: NM : PN : MP$$
$$:: H : ws : \sqrt{(w^2s^2 + H^2)}. \quad . \quad . \quad . \quad (2)$$
$$\therefore \frac{dy}{ds} = \frac{ws}{\sqrt{(w^2s^2 + H^2)}}.$$
$$\text{Hence } dy = \frac{ws\,ds}{\sqrt{(w^2s^2 + H^2)}}.$$

Integrating, we have $wy = \sqrt{(w^2s^2 + H^2)} + \text{constant}$.
Now, when $y = 0$, we have $s = 0$. $\therefore$ constant $= -H$.
Hence $wy = \sqrt{(w^2s^2 + H^2)} - H$. . . . . (3)
But in equation (2) we have $T = \sqrt{(w^2s^2 + H^2)}$.
$\therefore T = wy + H$.

Similarly, if P_1 be any point on the chain between Q and P, and T_1 the tension at P_1, we have

$$T_1 = wy_1 + H,$$

where y_1 is the ordinate of P_1.
Hence $T - T_1 = w(y - y_1)$.

Let $H = wa$—that is, let a be the length of chain whose weight is equal to the tension at the lowest point. Then equation (3) becomes

$$wy = \sqrt{(w^2s^2 + w^2a^2)} - wa.$$
$$\therefore w(y + a) = \sqrt{(w^2s^2 + w^2a^2)}.$$
$$\text{Hence } s^2 = 2ay + y^2.$$

Take a new origin on the axis of y at the distance a below Q. Then equation (3) referred to the new axes becomes

$$wy = \sqrt{(w^2s^2 + w^2a^2)}.$$
$$\text{Hence } y^2 = s^2 + a^2. \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (4)$$

Again, from (2) we have—

$$\frac{dy}{dx} = \frac{ws}{H} = \frac{w\sqrt{(y^2 - a^2)}}{wa} = \frac{\sqrt{(y^2 - a^2)}}{a}.$$
$$\therefore \frac{dy}{\sqrt{y^2 - a^2}} = \frac{dx}{a}.$$

Integrating, we have—

$$\log\left\{\frac{y + \sqrt{(y^2 - a^2)}}{a}\right\} = \frac{x}{a} + \text{constant},$$

and the constant is zero, since $y = a$ when $x = 0$.

$$\text{Hence } e^{\frac{x}{a}} = \frac{y}{a} + \frac{\sqrt{(y^2 - a^2)}}{a},$$

$$\text{and } e^{-\frac{x}{a}} = \frac{1}{e^{\frac{x}{a}}} = \frac{a}{y + \sqrt{(y^2 - a^2)}} = \frac{y - \sqrt{(y^2 - a^2)}}{a}.$$

$$\therefore e^{\frac{x}{a}} + e^{-\frac{x}{a}} = \frac{2y}{a},$$

$$\text{or } y = \frac{a}{2}(e^{\frac{x}{a}} + e^{-\frac{x}{a}}). \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (5).$$

Let h denote the sag. Then, if x, y are the co-ordinates of P, the top of the right-hand support, we have—

$$h = y - a.$$

$$\text{Now } e^{\frac{x}{a}} = 1 + \frac{x}{a} + \frac{x^2}{\lfloor 2a^2} + \frac{x^3}{\lfloor 3a^3} + \ldots$$

$$\text{And } e^{-\frac{x}{a}} = 1 - \frac{x}{a} + \frac{x^2}{\lfloor 2a^2} - \frac{x^3}{\lfloor 3a^3} + \ldots$$

Hence (5) may be written—

$$y = \frac{a}{2}\left\{2 + \frac{2x^2}{\lfloor 2a^2} + \frac{2x^4}{\lfloor 4a^4} + \ldots\right\}.$$
$$\therefore h = y - a = a\left(\frac{x^2}{\lfloor 2a^2} + \frac{x^4}{\lfloor 4a^4} + \ldots\right) \quad . \quad . \quad . \quad . \quad (6)$$

Assuming that in a flat catenary the tension at any point is sensibly the same as the tension at the lowest point, the relation $H = wa$ here becomes

$$2240 \times 50A = 1 \times \frac{A}{144} \times 8 \times 62{\cdot}5a,$$

where A is the area in square inches of the cross section of the wire and 62·5 is the weight in lbs. of 1 cubic foot of water.

Hence $a = 224 \times 144$ feet.

And, by the question, $x = 660$ feet.

$$\therefore \frac{x}{a} = \frac{660}{224 \times 144} = \frac{110}{224 \times 24},$$

so that x is small compared with a.

Hence (6) may be written—

$$h = a\frac{x^2}{\lfloor 2a^2} \text{ (approximately).} \quad . \quad . \quad . \quad . \quad (7)$$

We have then—

$$h = \frac{x}{a} \cdot \frac{x}{2} = \frac{110}{224 \times 24} \times \frac{660}{2} = \underline{6{\cdot}75 \text{ feet.}}$$

From (7) we have, by differentiation,

$$\frac{dh}{dy} = \frac{x}{a} = \frac{110}{224 \times 24} = \frac{1}{49} \text{ (nearly).}$$

Hence the slope of the wire at either end is about 1 in 49.

Lybster.—See answer to *Mack.*

J. B. Holmyard.—If the equation $(mx + c)^4 = a^2x^2$ have a pair of equal roots, show that

$$c = \frac{a}{4m} \text{ or } \frac{-c}{4m}.$$

(College of Preceptors, 1900.)

$$(mx + c)^4 = a^2x^2.$$
$$\therefore (mx + c)^2 = \pm ax.$$
$$\therefore mx^2 + 2cmx + c^2 = \pm ax.$$
$$\therefore m^2x^2 + (2cm \mp a)x + c^2 = 0.$$
$$\therefore x = \frac{-2cm \pm a \pm \sqrt{\{(2cm \mp a)^2 - 4m^2c^2\}}}{2m^2}.$$

Hence the given equation has a pair of equal roots when the quantity under the radical sign vanishes—

that is, when $(2cm \mp a)^2 - 4m^2c^2 = 0$.
,, ,, $4c^2m^2 \mp 4acm + a^2 - 4m^2c^2 = 0$.
,, ,, $a^2 \mp 4acm = 0$.
,, ,, $c = \frac{a}{4m}$ or $\frac{-a}{4m}$.

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PHYSIOGRAPHY.

(ADVANCED AND HONOURS.)

Monthly Temperatures for 1901.—We note from the December number of Symons's *Meteorological Magazine* that the highest monthly average temperature, shown by the black bulb thermometer, for 1901, was 123·4°, the absolute maximum being 137·7°, both being the registers for July. The lowest monthly mean temperature, as shown by the same instrument, was 36·9°, the absolute minimum being 24·8°, both in December.

The Glacial Period.—Herrn Paul and Fritz Sarasin suggest, in the *Verhandlungen* of the Naturforschenden Gerellschaft of Basle, that the cold which caused the glacial age may have been caused by the suspension of large quantities of dust particles in the air. They put forward the case of the Krakatoa eruption in proof of their theory, and compare the widespread results of this single eruption with what must have been the result of the numerous simultaneous eruptions that, judging from the extinct volcanoes of this age, must have taken place.

The Origin of Meteorites.—Mr. Farrington continues, in *The American Journal of Geology*, his remarks on meteorites, his aim being to lead up to a theory of their formation. He begins with what has been said in the past as to the origin of these interesting visitors from the clouds.

Sir Robert Ball opines that they are terrestrial matter discharged into space by the volcanoes of the earth, and returned to it again.

Laplace and **J. L. Smith** taught that meteorites are matter that has been discharged from the volcanoes of the moon.

Sorby, on the other hand, taught that meteorites have a solar origin.

Meunier's opinion was that the stones from the clouds are portions of shattered stars.

Boisse held them to be portions of a shattered planet.

Newton taught that they were portions of comets.

Brezina held that they were clouds of gas or dust cemented and solidified by the action of the earth's atmosphere.

Mr. Farrington's Views.—Before proceeding to give his own theory, the author sums up his evidence. In the first place, he says that nobody acquainted with the facts will be likely to traverse the three following statements:—

1. The majority of iron meteorites are octahedral.

2. The majority of stone meteorites are chondritic, and contain considerable glass.

3. Between iron and stone meteorites there is every gradation; they are formed of the same sort of matter.

Not so universally accepted.—He then gives four other conclusions that would not perhaps be so readily accepted, but in support of which we cannot, of course, give the evidence adduced, although we advise those who can get the magazine to read it with care.

4. The substance of meteorites was in a solid state before the fall of these bodies to the earth.

5. The structure of the majority of the meteorites shows that their substance has cooled from a liquid or semi-liquid condition to that of a solid.

6. The structure of the majority of iron meteorites shows that the change from a liquid or semi-liquid to a solid state has taken place slowly.

7. The structure of the majority of stone meteorites shows that the change from a liquid or semi-liquid to a solid has taken place rapidly.

Upon these facts the author founds the theory which follows—namely, that "meteorites are portions of a disrupted mass of cosmic matter which had a spheroidal form, increased in density towards the centre, and cooled from a liquid or semi-liquid to a solid state before disruption."

"It is not likely," he adds, "that the globes or spheroids, such as have been here hypothesised, were of large size. In the solar system, for example, there is no indication that the total disruption of a body anything like the size of a planet has ever taken place. Such an occurrence would produce effects more catastrophic in their nature than could be referred to matter so small in relative quantity as that which has within human experience reached the earth in the form of meteorites. Such globes would, perhaps, in their entirety never come within human observation. But that there exists in space a vast quantity of fragmental matter besides that visible to us as stars, nebulæ, and the bodies of the solar system, there can be little doubt."

A Recent Geyser in New Zealand.—In the central part of North Island, New Zealand, just south of the Auckland Peninsula, lies a region which is remarkable for volcanic action. It extends from the Ruapehu Mountains across Lake Taupo to the Bay of Plenty, and is known as the Hot Lake District. The district covers about four hundred square miles, the surface of which has been often changed by volcanic eruptions, as in June 1886, when the celebrated calc-sinter deposit, known as the pink and white terraces of Rotomahana, disappeared for ever, and more recently, when the Waimangu Geyser was formed.

In the valley of Echo Mountain the ground was formerly pierced by innumerable apertures of different sizes, from which streams of hot water and jets of steam issued at intervals. Now the landscape presents an entirely different aspect; for all these little geysers have vanished, to make way for a giant which far surpasses in height and power all former New Zealand geysers. Between Echo Mountain and Boiling River a small round lake has been formed, from the centre of which, at intervals of varying lengths, a thick column of black seething and foaming water is hurled high in the air, carrying with it mud and stones. This column maintains a uniform thickness to a height of from 650 to 800 feet, where it seems to remain stationary for a moment, and then it breaks, and the falling masses of black water unite with the snowy clouds of surging and hissing steam that rise from the lake to a great height.

When active, the geyser is a most imposing sight; but it is not safe to approach too near the shore of the lake, for the stones and mud reach the neighbouring hills to a distance of from 1,600 to 1,900 feet. Everything is here covered with the ejected mud and stones, so that this valley, once so charming, looks like a monotonous gray desert.

To make a Reliable Gauge.—If the observer is really in earnest, he should make a copper vessel 4″ in diameter and 6″ high, with the bottom set in 1″, so as to receive a copper tube which is bent twice at right angles, with its inner end inserted in the recessed bottom, and its outer end extended up outside the vessel and even with the bottom, so as to receive a ½″ glass tube which is cemented therein with a cement consisting of white lead, paint, and litharge formed into a soft putty.

The glass tube is 7″ long, and furnishes a ready means of ascertaining the depth of the water in the vessel when viewed in connection with the scale of inches attached to the vessel.

In the top of the vessel is inserted a funnel 3½″ long, with a cylindrical portion at the top 2″ deep. The upper and lower edges of the main vessel are wired, to give them rigidity, but the cylindrical top of the vessel is not wired.

A rubber band may be stretched around the funnel at the junction of the cylindrical and conical portions, to prevent waste by evaporation at this point. To ensure accuracy, the copper pipe which holds the glass tube should be filled with water before the observation begins.

When the gauge is used in a windy place, it should be clamped to some fixed object by three screws engaging the wire rim at the bottom of the vessel.—*Scientific American.*

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CHEMISTRY.

(ADVANCED AND HONOURS.)

BY T. CARTWRIGHT, B.A., B.SC.

The Supposed Ammonium (NH_4).—Discussing this question, Herr Otto Ruff reports as follows: "If a tube be taken shaped like an inverted Y, platinum electrodes are sealed into the bottom of the two lower limbs; these electrodes are surrounded with potassium iodide in small lumps, liquid ammonia is placed over the whole, and a current passed while the apparatus is kept at −70 to −95 by a mixture of liquid air and alcohol. Metallic potassium appears to be liberated at the cathode, and, rising into the upper layers of the liquid ammonia, colours them blue. When ammonium iodide is used, no blue coloration is produced, even when the top limb of the tube is sealed up and the experiment allowed to continue until the tube bursts, which did not happen in one experiment until enough electricity had passed to generate hydrogen gas, which must have produced a pressure of sixty atmospheres in the apparatus. It would seem that even under these favourable circumstances no metallic ammonium, analogous to metallic potassium, can have been produced. It may be doubted whether such a substance is capable of existing at all. Probably it is better to regard the group NH_4 rather as a compound, $N.NH_3$, which readily dissociates; it would then be analogous with the compounds of the alkali metals with ammonia, KNH_3, $NaNH_3$, $LiNH_3$.

Crystalline Metallic Compounds of Aluminium.—The alloy Cu_4Al_9 is obtained in the form of long, white, glistening crystals by melting together equal weights of aluminium and copper and pouring off the molten liquor as soon as crystallisation has begun. It has a specific gravity of 4·118, is not readily soluble in HNO_3, but dissolves easily in aqua regia. Hydrochloric acid decomposes it, dissolving the aluminium and leaving a residue of copper.

Iron-Aluminium.—This alloy is obtained in stout, iron-gray, glistening crystals by melting together the part of iron and the part of aluminium and extracting with a 2 per cent. solution of HCl. The crystals have a specific gravity 3·734. They become bluish in air, and dissolve readily in strong acids.

Nickel-Aluminium is prepared similarly to the iron compound. It forms glistening feathery crystals resembling nickel in colour, and has a specific gravity 3·681. It dissolves easily and completely in strong acids.

Cobalt-Aluminium.—The cobalt alloy differs both in composition and in properties from the nickel compound. The fused mass consists of parallel laminæ which, when etched, dissolve to feathery crystals which are coarser in structure and bluer in colour than the nickel compound.

Manganese and Platinum.—The manganese alloy forms tin-white crystal plates, and dissolves readily in strong HCl.

The platinum alloy forms stout, bronzy crystals of indistinct structure. HCl dissolves out all the aluminium.

Preparation of $K_2Mn_2O_8$ by Means of Ozone.—Potassium manganate in a strong alkaline solution is quantitatively converted into permanganate by the action of ozonised air at 40° in accordance with the equation

$$2K_2MnO_4 + O + H_2O = K_2Mn_2O_8 + 2KOH.$$

The potassium permanganate crystallises out, whilst the caustic potash is readily obtained on evaporation, and is employed in producing further quantities of manganese dioxide.

Gradations in the Properties of the Alums.—Mr. James Locke, an American chemist of repute, has given much time to the study of the gradation of the properties of the alums. The solubilities at 25° of nineteen alums of the formula $M^IM^{III}(SO_4)_2 12H_2O$ were determined, and the results are given, in gram molecules per litre, in the following table:—

	K	NH_4	Tl	Rb	Cs
Al	0·28	0·387	0·177	0·059	0·013
V	—	1·210	0·573	0·177	0·0204
Cr	0·441	0·407	0·212	0·078	0·0151
Fe	—	1·559	0·799	0·293	0·045
In	—	—	—	—	0·172

An increase in the atomic weight of the tervalent metal produces a steady increase in the solubility of the alum, except in the case of chromium, which shows an abrupt decrease. The influence of the univalent metal is somewhat similar: the solubility decreases as the molecular weight increases in the series K, Rb, Cs; but the ammonium and thallium alums are abnormal, and, with one exception, are intermediate in solubility between the potassium and rubidium alums. The solubilities were also determined at intervals of 5° up to 40° in the case of six alums, and it was found that the more soluble alums had in every case the larger temperature coefficients.

In the case of twenty-three alums, the temperature was determined at which the crystals melt in their water of crystallisation. The results are given in the following table:—

	Na	K	Tl	NH_4	Rb	Cs
Al	63°	91°	91°	95°	109°	122°
V	9°	20°	48°	45°	64°	82°
Cr	—	89°	92°	94°	107°	116°
Fl	—	28°	37°	46°	53°	71°
Co	—	—	—	—	47°	63°
In	—	—	—	—	36°	42°

These figures correspond closely with the results of the solubility determinations, the melting-point falling as the solubility increases. In the series Al, V, Fe, Cr, the melting-point falls as the atomic weight of the tervalent metal increases, whatever the nature of the univalent metal. But here, again, chromium shows an exceptional behaviour, and the melting-points of the chromium alums are abnormally high.

A New Cadmium Mineral.—A new cadmium mineral of the formula CdO has been found as a black shining crystalline incrustation and as powder on a mass of zinc ore with powdery iron oxide from Monte Poni, Sardinia. Analysis of this zinc ore gave the following results:—

ZnO	SO_2	Fe_2O_3	CaO	MgO	Cd
60·59	31·3	5·5	1·7	1·6	Nil

The crystals of cadmium oxide are regular octahedra. An analysis gave the following results:—

Cd, 87·5; O, 12·5 per cent.

Black cubes of cadmium oxide of the same characters as the natural crystals were obtained artificially by burning cadmium in oxygen. The only cadmium mineral previously found is greenockite (CoS), although, as is well known, cadmium in small quantity is of fairly frequent occurrence in zinc minerals, especially blende.

Reaction between Chlorine and Ammonia.—It is shown by Messrs. Noyes and Lyon that the normal reaction between ammonia and chlorine is represented by the equation

$$12NH_3 + 6Cl_2 = N_2 + NCl_3 + 9NH_4Cl,$$

the volume of nitrogen being one-sixth that of the chlorine. If the ammonia is present in excess, it reacts with the nitrogen chloride, giving free nitrogen, and probably also ammonium hypochlorite, thus—

$$NCl_3 + NH_3 = N_2 + 3NH_4Cl, \text{ and}$$
$$NCl_3 + NH_4OH + H_2O = 3NH_4ClO.$$

If the chlorine is present in excess, the ammonium chloride which is formed reacts with it to some extent, and little or no nitrogen is evolved. The nitrogen chloride was estimated by extracting the product of the reaction with benzene. The benzene solution was shaken with excess of arsenious oxide dissolved in a solution of sodium hydrogen carbonate, and the excess of the hydrate determined by standard iodine. After titration, the ammonia was estimated by distillation.

The Action of Ammonia on Metals at High Temperatures.—Pt, Au, Ag, Cu, Fe, Ni, and Co have been exposed to the action of ammonia at temperatures ranging from 400° to 900°. In every case the physical effect of the treatment was to disintegrate the metal completely, whilst a large proportion of the ammonia was resolved into its elements. The fracture of metals that have been exposed to this action is spongy or cellular; under the microscope the metal appears as if it had been suddenly cooled whilst in a state of active effervescence. The penetration of the ammonia molecules into the metal is remarkably quick if the conditions are favourable. Messrs. G. T. Beilby and G. G. Henderson, who have been considering the subject, are of opinion that the physical effects that result from the action of ammonia on metals at high temperatures are due to the alternate formation and dissociation of nitrides taking place between certain narrow limits of temperature, the reaction going in one direction or the other according as ammonia or hydrogen molecules preponderate in the gases which are in contact with the molecules of the metal at and below the surface. In several cases the formation of nitrides had been definitely proved. The absorption of small quantities of nitrogen by pure iron renders it hard and brittle like steel.

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The Dynamo.—When a conductor moves so as to cut lines of force, an electro-motive force will be generated, which, if the conductor forms part of a metallic circuit, will produce a current in the latter. It is on this principle that all dynamos are constructed. Consequently, in designing a dynamo, we must first provide a magnetic field which is as strong as possible; we must then arrange that electrical conductors shall cut the lines of force of this field, and that the induced E.M.F. shall produce an electric current in the circuit in which the conductors are comprised.

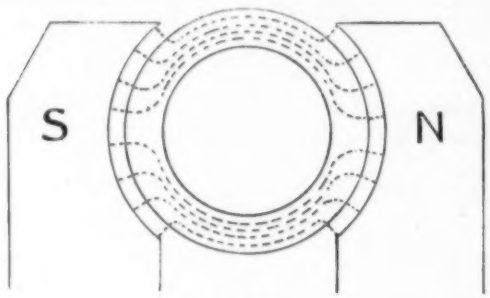

FIG. 1.

The magnetic field is produced by the **field magnets** N S, Fig. 1. In some of the earliest machines permanent magnets were used, but the universal custom at the present day is to use electro-magnets. The method of maintaining the magnetisation of these will be described later on. For the present it is sufficient to remember that lines of force will spring from the N pole and take the shortest route to the S pole. In order to concentrate the lines of force as much as possible, an **armature core**, consisting of wrought iron, is placed between the magnet poles. In the class of machine which will here be considered, the armature core consists of a hollow cylinder built up from thin stamped plates of wrought iron, insulated from each other by paper or varnish. Each stamping has the shape of the annulus shown between N and S in Fig. 1. The lines of force spring off normally from the cylindrical curved surface of N, and enter the armature core normally at the right-hand side. After traversing the core in the manner shown by the dotted lines, they leave it normally at the left-hand side, and enter the cylindrical curved surface of S normally. In a well-designed machine there will be practically no lines of force in the interior of the armature core.

The air space between the cylindrical curved surface of a magnet pole and the armature core is termed the **air gap.**

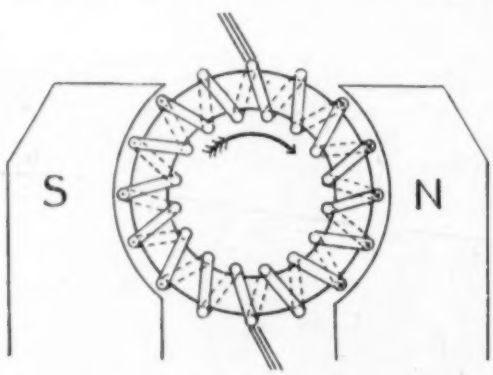

FIG. 2.

Fig. 2 represents the winding of a **ring armature.** An insulated copper wire is wound round the core in such a manner that it constitutes a closed circuit. The conductors in the air gap extend perpendicular to the plane of the paper, and are therefore perpendicular to the lines of force crossing the air gap.

Let us suppose that the insulation is removed from certain points on these conductors, so that the metallic brushes (+ and −, Fig. 2) can make contact with them.

If we now set the armature in rotation, it is easily seen, by comparison of Figs. 1 and 2, that the conductors will cut the lines of force crossing the air gap. In each of these conductors an E.M.F. will be generated in a direction which can be determined by the left-hand rule already given. In Fig. 2, let the direction of rotation of the armature be that indicated by the arrow. Then, remembering that the lines of force enter the armature core from the right, it is obvious that in applying the left-hand rule to the right side of the armature, we must suppose that we grasp one of the conductors, extending along the air gap in a direction perpendicular to the paper, with the left hand, so as to pull it downwards, the fingers being extended along the direction from N to S; the thumb, extended along the conductor, gives the direction of the E.M.F., and this is found to be from the front to the back of the armature—that is, downwards through the paper (Fig. 2).

The direction of an E.M.F. in a conductor perpendicular to the paper can be indicated as follows:—When an arrow approaches you, you see the point; thus a small dot in the centre of a circle representing the section of a conductor will indicate an E.M.F. acting upwards through the paper. On the other hand, when an arrow is travelling away from you, you see the feathers; thus a small cross in the centre of a circle representing the section of a conductor will indicate an E.M.F. acting downwards through the paper.

Each conductor in the air gap to the right of Fig. 2 will generate an E.M.F. acting from front to back of the armature. The parts of the armature circuit which are inside the core will not generate any E.M.F., since they do not cut lines of force (Fig. 1). It will thus be seen that the half of the armature circuit to the right of Fig. 2 generates an E.M.F. which tends to send a current upwards from − to +.

Turning our attention now to the conductors in the air gap to the left of Fig. 2, it can easily be proved, by applying the left-hand rule, that the E.M.F. acts from the back to the front of the armature, as indicated by the dots in sections of conductors. The conductors inside the armature generate no E.M.F., and therefore the part of the armature circuit to the left of Fig. 2 will, as a whole, generate an E.M.F. tending to drive a current upwards from − to +.

When no external connections are made between − and +, there will be no current flowing in the armature, if the winding of the latter is symmetrical and the pole faces are equal. The two E.M.F.'s generated on opposite sides of the armature tend to drive currents round the closed armature circuit in opposite directions, and thus neutralise each other.

When, however, the brushes − and + are connected externally, both halves of the armature tend to drive electric currents from − to + through the armature circuit, and from + to − through the external circuit.

The E.M.F. of the dynamo will be that generated by one half of the armature circuit, since the two halves of the latter are virtually connected in parallel with each other. Half of the current generated will flow up each half of the armature circuit.

Problem.—In Fig. 2 there are five conductors in the air gap, on each side of the armature. If the length of the armature from front to back is 30 cms., its external diameter being 40 cms., and its speed 1200 turns per minute, what will be the E.M.F. of the dynamo? The field in the air gap is equal to 15,000 lines per square centimetre.

The E.M.F. in each conductor cutting lines of force is equal to VLB, where V is the velocity and L the length of the conductor, the field being equal to B. In the present case, each conductor moves round a circle of 40 cms. diameter 1200 times a minute, or 20 times a second. Its velocity V is thus equal to $\pi \times 40 \times 20 = 2512$ cms. per second.

Thus, the E.M.F. in volts, generated by a single conductor, is equal to $\frac{VLB}{10^8} = \frac{2512 \times 30 \times 15000}{10^8}$.

Since there are five active wires on each side of the armature, the E.M.F. of the dynamo will be equal to five times this value—that is, to

$$\frac{5 \times 2{\cdot}512 \times 10^2 \times 3 \times 10^1 \times 1{\cdot}5 \times 10^4}{10^8}$$

$$= 5 \times 2{\cdot}512 \times 3 \times 1{\cdot}5$$

$$= 56{\cdot}4 \text{ volts.}$$

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THE preceding equations are very important, and may be brought together for reference—

$$F = ma,\ Ft = mv,\ Fs = \tfrac{1}{2}mv^2.$$

Questions on the above are presented in so many different forms that something more than a mere acquaintance with them is necessary. Probably the best method of becoming familiar with them is to use any possible opportunity of working out numerical exercises.

Ex. 1. To the ends of the cords in Atwood's machine are attached two pans, each weighing 3 lbs. In one is placed a 2-lb. weight, and in the other a 1-lb. weight. Find the pressures between these weights and the pans in which they are placed.

Solution.—The acceleration is $\dfrac{2-1}{2+1+6}g = \dfrac{g}{9}$.

If N denote the pressure between the 2-lb. weight and its pan, then

$$\frac{2-N}{2} = \frac{a}{g} = \frac{1}{9}.$$

$$\therefore N = 1\tfrac{7}{9} \text{ lbs.}$$

Similarly, the pressure M between the 1-lb. weight and its pan is obtained from $\dfrac{M-1}{1} = \dfrac{1}{9}$. $\therefore M = 1\tfrac{1}{9}$ lb.

Ex. 2. Give a description of Atwood's machine. Two equal buckets, each weighing 3 lbs., are connected by a cord, which passes over a smooth fixed pulley. They contain at first a 2-lb. weight and two 1-lb. weights respectively. If now one of the 1-lb. weights be removed, determine the motion, and also the pressure on the pulley and the tension of the cord. (1900.)

Solution.—When one of the 1-lb. weights is removed, then there is on one side a weight of 5 lbs., and on the other 4 lbs.

$$a = \frac{5-4}{5+4}g = \frac{g}{9}.$$

Having found the acceleration, the space described in any time t can be found from the equation $s = \frac{1}{2}at^2$, and the velocity at any time t from $v = at$.

The tension of the cord is $\dfrac{2\times5\times4}{5+4} = \dfrac{40}{9} = 4\tfrac{4}{9}$ lbs.

The pressure on the pulley is the resultant of two like parallel forces, each of $4\frac{4}{9}$ lbs.

$\therefore$ pressure on pulley $= 8\frac{8}{9}$ lbs.

Ex. 3. Two particles of given masses are connected by an inextensible thread which passes over a smooth point. One of the particles is at rest on a table, while the other descends. Find their common velocity the instant after the thread is drawn straight.

The mass of the particle at rest is 5 lbs.; the mass of the descending particle is 3 lbs., and it falls through 10 ft. before the string is drawn straight. How much of the kinetic energy disappears when the thread is drawn straight? (1892.)

Solution.—Velocity of mass of 3 lbs. at the instant the thread is drawn straight is given by $v^2 = 2gs$ (if g be taken to be 32·2).

$$v^2 = 64{\cdot}4 \times 10. \quad \therefore v = \sqrt{644}.$$

Let V denote the velocity of the larger mass. At the instant the thread is drawn straight the two masses move at a uniform speed.

Hence $V(5+3) = 3 \times \sqrt{644}$.

$$\therefore V = \frac{3\times\sqrt{644}}{8} = 9{\cdot}5 \text{ ft. per sec.}$$

Kinetic energy before string is drawn straight $= \frac{1}{2} \times 3 \times 644$ = 966 foot-poundals.

Kinetic energy after string is drawn straight $= \frac{1}{2} \times 8 \times (9{\cdot}5)^2$ = 361 foot-poundals.

$\therefore$ loss of kinetic energy = 966 − 361 = 605 foot-poundals.

Ex. 4. (*a*) A particle, whose mass is W, moves from rest under the action of a force which does on it U units of work in a certain time. What is its velocity at the end of that time?

(*b*) Suppose the work done is 75 foot-pounds, and the mass of the body 27 lbs.; what is its velocity?

(*a*) Let V be the velocity.

The units of work done in a given time may be obtained from the equation

$$\frac{1}{2}\frac{W}{g}V^2. \quad \therefore U = \frac{1}{2}\frac{W}{g}V^2.$$

$$\text{Hence } V = \sqrt{\frac{2gU}{W}}.$$

(*b*) Substituting the given values,

$$V = \sqrt{\frac{2\times32\times75}{27}} = 13\tfrac{1}{3} \text{ ft. per sec.}$$

Ex. 5. A bullet, moving at the rate of 1100 feet per second, passes through a plank, and comes out with a velocity of 1000 feet per second. If it then passes through another plank exactly like the former, with what velocity will it come out of this second plank? (1895.)

Let m denote the mass of the bullet (in pounds).

Loss of energy in passing through one plank is

$$\tfrac{1}{2}m(1100^2 - 1000^2) = \tfrac{1}{2}m \times 210000.$$

As the two planks are said to be exactly alike, we may assume that the loss of energy in passing through the second will be the same as that lost in passing through the first plank. Hence, if v denotes the velocity at which the bullet leaves the second, we have

$$\tfrac{1}{2}mv^2 = \tfrac{1}{2}m \times 1000^2 - \tfrac{1}{2}m \times 210000.$$

$$\text{Or } v^2 = 1000^2 - 210000.$$

$$\therefore v = 888{\cdot}8 \text{ ft. per sec.}$$

Having found the amount by which the velocity is reduced, it will be found instructive as an exercise to obtain the loss of momentum and loss of kinetic energy of the bullet.

Ex. 6. A mass of 1 lb. falls a distance of 3 ft. on to the head of a nail, which is sticking vertically in the horizontal face of a fixed piece of wood, and drives it in a third of an inch. Regarding the mass of the nail as negligible, find the average resistance of the wood and the time of penetration. (1898.)

The average resistance, multiplied by the distance in feet through which the nail descends, is equal to the energy given out by the falling mass. (Let $g = 32$.)

If R denote the average resistance in lbs. weight, then

$$R \times \frac{1}{36} = \frac{1}{32} \times 36\tfrac{1}{3} = \frac{109}{3\times32}.$$

$$\therefore R = \frac{109\times36}{3\times32} = 40{\cdot}87 \text{ lbs.}$$

To find the time of penetration, we use the equation $Ft = mv$.

When the mass has fallen through a distance equal to 3 feet, its velocity v can be obtained from the equation $v^2 = 2gs = 64 \times 3$.

$\therefore v = 8\sqrt{3}$ (if $g = 32$).

Hence $40{\cdot}87 \times t = 1 \times 8\sqrt{3}$.

$$\therefore t = \frac{8\sqrt{3}}{40{\cdot}87} = {\cdot}34 \text{ second.}$$

Ex. 7. A body weighing 2 lbs. descends in water. It falls through a distance of 4 inches in a certain second, and 10 inches in the next 2 seconds. Find the average resistance.

Here 4 in. $= \frac{1}{3}$ ft., and 14 in. $= (10+4)$ in. $= \frac{7}{6}$ ft.

From $s = Vt + \frac{1}{2}at^2$ we have

$$\tfrac{1}{3} = V + \tfrac{1}{2}a,$$

$$\tfrac{7}{6} = 3V + \tfrac{1}{2} \times 9a.$$

$$\therefore a = \tfrac{1}{18} \text{ ft. per sec. per sec.}$$

Force causing motion is $(m - P)g$, where m is the mass of the body and P is the resistance.

Hence from Equation (3) we have $(m - P)g = m \times a$.

$\therefore (2 - P)g = 2 \times \frac{1}{18} = \frac{1}{9}$. $\therefore P = 1{\cdot}99$ poundals.

Ex. 8. If a body moves in a straight line under the action of a force which in every three seconds increases its velocity 8 feet a second, what distance would it describe from rest in half a minute? (1884.)

Ans. 1200 feet.

Ex. 9. What is the connection between "impulsive force" and "momentum"? A one-ounce bullet strikes a block of wood with a velocity of 1500 feet per second, and has its momentum destroyed in 1200th of a second. Determine the "impulse" of the force. Ans. 93·76.

Ex. 10. A particle A, whose mass is 3 lbs., is tied by an inextensible thread to a particle B, whose mass is 5 lbs., and B is placed on a smooth table, while A is allowed to fall from the edge. At first the thread is slack, but at the instant A has fallen 9 feet the thread is drawn tight. With what velocity does B begin to move?

What part of the kinetic energy of the system disappears when the thread is drawn tight? (1896.)

Ans. 9 ft. per sec.; $\frac{3}{8}$ths.

Ex. 11. The mass of a particle is $1\frac{1}{2}$ lbs.; its velocity changes from 15 to 35 feet per sec. while it describes a distance of 25 ft. Find the force which produces the change, and how many foot-poundals of work it does in producing the change. (1901.)

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THE EDITOR'S TABLE

RECENT PUBLICATIONS FOR TEACHERS OF MODERN LANGUAGES.

TEACHERS of modern languages will welcome the two volumes just published by *A. and C. Black*. The first, entitled **Loyal Serviteur**, is a history of Bayard, the knight *sans peur et sans reproche*, and is well suited for beginners. It is furnished with a vocabulary and with two pages of notes, but, as the text is easy, this will be found quite sufficient. The other, entitled **The Age of Louis XI.**, is for advanced students, and has no vocabulary, but the notes deal with a variety of matter, both historical and grammatical, and there are exercises based on the text. The book should be doubly useful, as it consists of extracts from the chief historians dealing with a most important period in French history, and so the student is not only gaining historical knowledge, but is having practice in different styles of French prose.

The American Book Company also sends two volumes—one a children's story, **L'Enfant de la Lune**, and the other the extremely popular comedy by Labiche and Martin, **Le Voyage de M. Perrichon**. Both are well got up, and are provided with vocabularies.

We are glad to acknowledge the receipt of the monthly issue of **Causeries Françaises** (*Payot:* Lausanne), which many of our teachers of French will find of great use to them in their work.

Among the German books we have received **Der gerade Weg der beste**, by Kotzebue; a bright little play, published by *Messrs. Blackie and Son*. This seems to be the first of a series of "Little German Classics," which will form a companion to the "Little French Classics," and should meet the needs of many teachers who are anxious to find good, simple German works which are not too long.

German Vocabularies for Repetition (*Methuen and Co.*) may be very useful in the hands of a good teacher. The book contains one hundred and fifty-one vocabularies arranged according to subjects. We cannot think much of the plan of merely learning lists of words, unless they form the basis of a conversational lesson afterwards. For this purpose the vocabularies would be more useful if they did not consist almost entirely of nouns.

The Clarendon Press has just issued a **Guide to Advanced German Composition**. After sixty-six pages of excellent instruction in the principles of German composition, the book supplies for practice a large number of passages selected from every class of English prose. These are arranged in three sections in order of difficulty, and each passage is followed by notes on the method of translation, which, though always sufficiently full, are more ample in the earlier part. We do not know a better book on the subject.

The American Book Company has issued two German plays in one volume, for school use, **Der Prozess** and **Einer muss heiraten**, which are very well suited for young students, and are carefully edited, with vocabulary and exercises.

Only those who have tried it know how many useful conversation lessons can be based on a single picture, especially when the picture is drawn with the special object of affording material for such lessons. The pictures in the Hölzel series are well known, and now those who desire help in framing their conversations are provided with handbooks. We have before us the handbooks, in Dutch, Spanish, and Italian, on the picture of Spring, and so much matter does the picture present that each book contains over twenty pages of conversation. They may be obtained from *Messrs. Hachette and Co.*

The Practical Teacher's Art Monthly, Vol. IV. There can be no doubt that this useful book has come to stay. Every branch of art instruction taken in our elementary schools finds treatment in its pages, and every teacher who is fond of the teaching or the study of art should be a regular subscriber. One feature of special merit, apart from the assistance afforded in school work, is the reproduction and description of one of the world's great pictures in each issue, and the teaching we can get from the consideration of a great picture forms an important part of our general education.

READING BOOKS: SPECIAL AND GENERAL.

PUBLISHERS have indeed been busy of late in compiling reading books to keep pace with the ever increasing demand. No longer, it seems, is the reading book to be a commonplace kind of school article. The selections for reading matter are better, the type is clearer, the illustrations are more profuse and ideal, and the binding and general appearance of the books themselves are far in advance of what has obtained until quite recent times. New methods of teaching, and wider home-reading of the older children, are possibly the causes of more and better books being published. From the pile on the table before us, it is impossible to come to any other conclusion than to say that the school boy or girl of to-day lives in a paradise of good books.

This remark will apply with special force to those scholars who are fortunate enough to have the **Royal Prince Readers** put into their hands. Books I. and II. of this series are now ready, and are models of what books for the younger scholars should be. The matter is varied and well chosen, the printing remarkably clear, and the illustrations include many beautiful specimens of colour printing.

The geography readers call for special notice, not only for the immense amount of matter they contain, but for the profuse and beautifully printed illustrations and maps that adorn their pages. *Messrs. Longmans* issue three new books—**The British Isles, Africa and Australia**, and **America**. They bear the old name of "Ship" Series, and are sure to continue in favour with many teachers. The type is easily read, the illustrations are the best that can be reproduced, many of them being of exceptional beauty, while the fascinating headings of some of the chapters show that they at least will not prolong the old system of making the geography lessons a mere repetition of names. Each book contains a useful summary of notes and maps.

The "New Era" Geography Reader (**Europe**), published by *Sir Isaac Pitman and Sons*, contains much that is new. The matter is brightly written, and entertaining to a high degree, while the maps and coloured pictures are excellent in every way.

Messrs. Macmillan's **America** (New Geography Readers) is also a very good publication. In two hundred and fifty odd pages we get a clear and concise description of a vast continent, under the usual divisions of British America, The United States, Central America, and South America. It includes a great deal of history, and the chapters on productions are very fine indeed. There is a short but useful summary.

Another book on **America** is that published by *Messrs. W. and R. Chambers*. This, in addition to its containing coloured scenes of exceptional merit, sets out its information in a really enchanting manner. Some of the black-and-white illustrations are decidedly new, and therefore all the more acceptable.

For a special course of study for Standard III., *Messrs. Thomas Nelson and Sons* issue a well-written and comprehensive **History of the Midlands**. It is the work of Mr. Harold Armitage, who has spent much time in looking out the records of a portion of our country rich in historical events. It deals with the counties of Derby, Nottingham, Leicester, Stafford, Warwick, Worcester, and Northampton. Children in these counties will fairly revel in reading what took place near and about their own homes in the days that are gone. The book is equally serviceable for both the history and the geography lesson. The chapters on the greater towns are full of details which cannot be got from an ordinary geography of England.

For the history lesson there are several new books. That by *Messrs. Macmillan* comes first to hand. It is called **New History Reader, Book II., Intermediate**, and deals with the history of England from the earliest period to the Victorian Era. The matter is well written, and the whole book is a very nice edition for a Standard IV. The pictures of people—John Colet, Whitfield, Admiral Rodney, and Disraeli, for example—are above the average of black-and-white engravings.

Messrs. W. and R. Chambers's **Stories from English History** are very interesting. They deal with the history of England from B.C. 55 to the present time, and only those which have some particular bearing on the progress of the people are chosen. This is a commendable feature, and will appeal to the true teachers of history.

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*** The above books are recommended in "The Practical Teacher" for January, page 356, for the "D" Certificate.*

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And now we come to the general and supplementary readers. **A First Book of English Poetry**, by John M'Iver, published by *Robert Gibson and Sons*, Glasgow, contains a well-selected and useful course of verse reading, much of which is suitable for adding interest to the geography and history lessons. It is well bound and printed, and contains no notes.

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Then there is the wise mother-duck, with the downy yellow and brown ducklings, on the sun rippled pond; while on the bank by the waving rushes stands the handsome drake in all his majesty. Then we have the innocent-eyed calf regarding a mother-duck and her yellow brood in a farmyard; and again we have a comfortably-stout mother-sow feeding at a trough in her sty with her four "pinky piglings" with their little curly tails. There are also the sheep in the meadow, the goats on the hillside, and the cow knee-deep in the pond; while, lastly, as an example of gorgeousness and pride, we have magnificent peacocks on smooth lawns spreading their beautiful tails in the sun.

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Without wishing to be hypercritical, we cannot agree with the author when he tells us that the hare (p. 52) is "forbidden to be eaten *because* 'he cheweth the cud,'" giving Lev. xi. 6 as his authority; but, on looking up this reference, we read, "because he cheweth the cud, *but divideth not the hoof.*" Surely the lack of division in the hoof was the reason of the animal being reckoned unclean, otherwise the Levitical law is inconsistent with itself.

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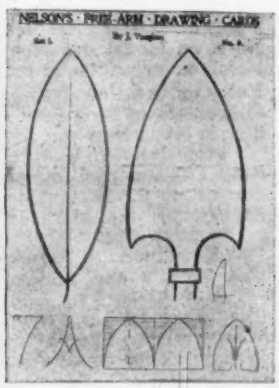

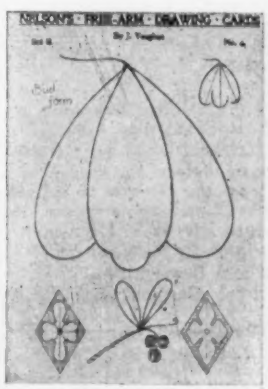

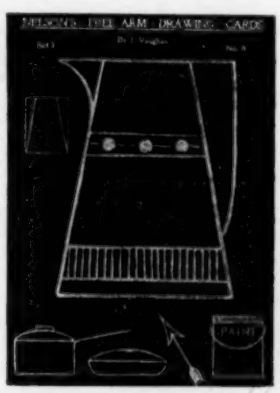

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